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ABSTRACT

This bibliography contains information concerning publications of studies and projects which were supported by the Division of Science Information of the National Science Foundation. The first part of the bibliography presents the reports of studies directly produced by NSF. The other part consists of the annotations of the reports which are arranged in chronological order by year of publication. (Author/SA)

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Annotated Bibliography 1973-1977

U S DEPARTMENT OF HEALTH EDUCATION & WELFARE
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National Science Foundation
Directorate for Scientific, Technological, and International Affairs
Division of Science Information

SE 029 210

ANNOTATED BIBLIOGRAPHY
1973 - 1977
DIVISION OF SCIENCE INFORMATION

June 1979

NATIONAL SCIENCE FOUNDATION
Directorate for Scientific, Technological and International Affairs
Washington, D.C. 20550

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INTRODUCTION

This bibliography contains the resumes of reports, articles, conference papers, and other publications produced during 1973-77 by projects supported by the Division of Science Information. While every effort has been made to identify all relevant materials, it is quite likely that some papers produced by staffs of the projects in question have not come to the attention of the compilers and are thus not included.

The first section of the bibliography lists four reports produced directly by NSF; the remaining entries are arranged chronologically by year of their publication. As main products of supported research, technical reports produced by specific projects are all provided with unique accession numbers, e.g., 021, 056 where there has been only one major technical report, and 012-1, 012-2, 012-3 where there have been more than one technical report. Other publications ensuing from a given project's work are assigned an alphanumeric code, e.g., 005a, 005b, 005c, etc. Within each year's section, the technical reports are cited alphabetically by first or corporate authors. Related publications, those bearing alphanumeric codes, are listed alphabetically by author following their projects' technical reports.

Several alternative methods may be used to locate a particular document. If the date and author of the publication are known, the entries of the particular year can be scanned, otherwise the bibliography's contents may be accessed by the names of the authors, associated corporate authors, report or publication titles, award number, and subject, as listed in the respective indices.

The National Science Foundation is pleased to make this bibliography available and invites comments from its users.

DEFINITIONS

The following definitions are essential to an understanding of Division activities:

- 'Award' refers to financial support given in the form of a grant, contract, interagency agreement, or other arrangement, depending upon the nature of the research work to be completed, the terms of performance, and the institution that performs the research work.

- 'Amendment' refers to the addition of funds to an existing NSF supported project with or without increasing the duration of NSF support.

- 'Principal Investigator' refers to the chief scientist or administrator who is responsible for coordinating the research plan of the NSF supported project.

- 'Institution' refers to any college, university, public or private institution, industry, or other organization, whether operating for profit or on a non-profit basis, as well as State local governments and Federal institutions.

Information contained in the bibliography was obtained from program sources and may differ from official NSF records.

REPORTS PUBLISHED BY THE NATIONAL SCIENCE FOUNDATION

001 Division of Science Information
National Science Foundation
1800 G Street, N.W.
Washington, DC 20550

U.S.-U.S.S.R. COPYRIGHT NEGOTIATIONS ON SCIENTIFIC AND TECHNICAL JOURNALS. June 1974. 52 pages.

Availability: NTIS, PB 236 887

The results of a survey of U.S. publishers concerning the U.S.-U.S.S.R. copyright negotiations for scientific and technical journals are presented.

A year after the U.S.S.R. joined the Universal Copyright Convention (UCC), certain trends in U.S.-U.S.S.R. negotiations for the rights to reproduce and translate scientific and technical journals became more discernible. For some U.S. publishers, achieving an equitable return for granting the Soviets the right to continue reproducing 270 U.S. scientific and technical journals is of primary importance; for others, securing at minimum cost the right to continue translating over 150 Soviet journals for the benefit of the U.S. English-reading scientific and technical community is the main consideration.

Initial uncertainties about Soviet negotiating plans and strategy have been reduced by passage of time, accumulation of negotiating experience by U.S. publishers, and the communication of relevant information between U.S. publishers and the Federal government.

The survey found that over half of the U.S. publishers declined the Soviet standard offer of a 7.5% royalty based on the Soviet subscription price. This price is generally lower than the U.S. domestic or foreign rate. Most U.S. publishers who declined the Soviet offer had counterproposed terms and conditions that would either recover first copy costs or provide a reasonable return on investment. The relatively slow rate of progress in completing agreements with U.S. publishers caused the Soviets to increase their subscriptions for a limited number of U.S. journals. The subscriptions will be placed in key libraries and information centers throughout the U.S.S.R. from which single photocopying service will be provided on demand. Three U.S. publishers secured the translation rights for more than three-fourths of approximately 160 Soviet

scientific and technical journals which are translated and republished in the United States.

002 Division of Science Information
National Science Foundation
1800 G Street, N.W.
Washington, DC 20550

FEDERAL SCIENTIFIC AND TECHNICAL COMMUNICATION ACTIVITIES: 1974 PROGRESS REPORT. June 1975. 103 pages.

Availability: NTIS, PB 242 318

This publication is the first in the series of annual reports sponsored by the Office of Science Information Service (OSIS), later Division of Science Information (DSI), and as of January 1978 the Division of Information Science and Technology (IST), National Science Foundation. The report includes descriptions of over 50 Federal information programs.

Each program prepared its own description. The IST compiled the descriptions and prepared a list of acronyms and abbreviations and an index. Details of program activities are included in the program descriptions or are available from responsible officials whose names are appended to respective descriptions.

The report was prepared solely from micropublication, without initial hard copy distribution. Distribution to Federal agencies was in microfiche. NTIS can supply both microfiche and hard copy, depending on the purchaser's preference. By publishing in microform, IST reduced publication and distribution costs, and hoped to stimulate further micropublishing of Federal reports.

003 Division of Science Information
National Science Foundation
1800 G Street, N.W.
Washington, DC 20550

FEDERAL SCIENTIFIC AND TECHNICAL COMMUNICATION ACTIVITIES: 1975 PROGRESS REPORT. June 1976. 91 pages.

Availability: NTIS, PB 253 975

The 1975 activities of more than 60 Federal programs in 15 executive departments and independent agencies, the Smithsonian Institution, Government Printing Office, and the Library of Congress are highlighted in narrative form. The

report includes a new feature; a chapter on "Developments and Trends" which provides an overview of Federal information activities in 1975.

004 Division of Science Information
National Science Foundation
1800 G Street, N.W.
Washington, DC 20550

FEDERAL SCIENTIFIC AND TECHNICAL COMMUNICATION ACTIVITIES--1976. October 1977.

Availability: NTIS, PB 212 800

The descriptions of 1976 Federal scientific and technical information activities for more than 50 programs are presented. The descriptions, provided voluntarily by Federal agencies, emphasize new developments and achievements rather than routine ongoing activities. A prefatory chapter analyzes and summarizes significant activities, developments and trends within the Federal scientific and technical information community, as described in the agencies' submissions. Appendixes include a glossary of acronyms, a listing of key personnel associated with individual programs, and a general index.

005 American Institute of Physics
335 East 45th Street
New York, NY 20550

Grant: GN-42062
Date: 1973

005a Alt, Franz L.; Judith Yuni Kirk.
COMPUTER PHOTOCOMPOSITION OF TECHNICAL TEXT.
Communications of the ACM,
Vol. 16, No. 6, June 1973, pages 386-391.

Computer-assisted typesetting by means of photocomposition is discussed. Special problems, such as the setting of highly technical material (e.g., mathematical formulas), are dealt with in detail.

005b Feinman, Robert D.; K. L. Kwok
CLASSIFICATION OF SCIENTIFIC DOCUMENTS BY MEANS OF SELF-GENERATED GROUPS EMPLOYING FREE LANGUAGE.
Journal of the American Society for Information Science, Vol. 24, September-October 1973, pages 382-395.

A study was undertaken to classify mechanically a document collection using the free-language words in the titles and abstracts of a corpus of 261 physics research papers. Using a clustering algorithm, results were obtained which closely duplicated the clusters obtained by previous experiments with citations. A brief comparison is made with a traditional manual classification system. It is shown that the mechanical optional procedure is capable of achieving simultaneous coverage relevance and recall figures above 80%.

005c Feinman, Robert D.; K.L. Kwok
THE CONSTRUCTION OF JOURNAL-ORIENTED CLASSIFICATION SCHEMES. Journal of the American Society for Information Science, Vol. 24, No. 1,
January-February 1973, pages 71-72.

As part of its Physics Information Program, the American Institute of Physics instituted a new set of publications entitled Current Physics Advance Abstracts for

which the author submits an indexed copy of his abstract. The article discusses such problems as indexing performed by the author, the heirarchical system used, and the publication process itself. The indexing scheme was designed to be used in a variety of products including magnetic tapes, printed current awareness journals, and indexes. In the first 6 months, only 33% of the 70% author response required some corrections.

005d Koch, H. William
THE COMMUNICATIONS REVOLUTION IN PHYSICS. The American Physical Society Meeting, New York, January 1973, 21 pages.

An outline of a three-stage program is presented which offers solutions to communications needs and problems in physics. The three stages are: (1) standardizing journal production; (2) computerizing abstracts and titles and micropublishing of journal pages; and (3) improving conventional journals, plus new communications options. The paper also describes the communications revolution, information needs of physicists, and future trends in communication.

005e Rosen, Carol Z.
A MATERIALS INDEX--ITS STORAGE, RETRIEVAL, AND DISPLAY. Journal of Chemical Documentation, Vol. 13, No. 3, August 1973, pages 123-126.

An experimental procedure for indexing physical materials based on simple syntactical rules was tested by encoding the materials in the journal, Applied Physics Letters, to produce a materials index. The syntax and numerous examples, together with an indication of the method by which retrieval can be effected, are presented.

006 Boyd, J. R.
Department of Mathematics
Guilford College
Greensboro, NC 27410

Grant: GN-36352
Date: 1973

JOURNAL OF UNDERGRADUATE MATHEMATICS.

Availability: Contact publisher

This journal is published biannually in March and September by Guilford College. Its purpose is to publish research papers and writings of undergraduate students majoring in mathematics. The journal is produced with the cooperation of 25 universities and colleges in the United States and Canada.

007 Freeman, James E.; James P. Kottenstette; Martin D. Robbins
Industrial Economics Division
Denver Research Institute
University of Denver
University Park
Denver, CO 80208

Grant: GN-32880
Date: August 1973

NEW INFORMATION SERVICES IN SOCIAL PROBLEM AREAS: ENERGY, ENVIRONMENT AND TRANSPORTATION. 94 pages.

Availability: Contact authors

This study was designed to survey new information services operating in major social problem areas. Operationally, it was aimed at identifying and characterizing serial publications initiated since 1962 in the areas of energy, environment, and transportation. In addition, the study involved a preliminary identification of factors limiting the social impact of these new problem-oriented serials.

The research project proceeded through three phases. In Phase I, the areas of energy, environment, and transportation were selected for analysis from an array of 14 major social problem areas; numerous statements by political, industrial, religious, other organizations, and special interest groups were used to generate the array. Phase II, determining the extent of new problem-oriented information services, involved three data collection activities: (1) identifying new English-language serial publications; (2) surveying editors of the new serials; and (3) analyzing the contents of these information services. Phase III, the preliminary impact analysis, included interviews with approximately 200 persons in different interest groups (e.g., editors, researchers, librarians, citizen activists).

Altogether, 539 English-language serials in the areas of energy, environment, and transportation were identified as having originated after 1962. Other new services include libraries and computerized bibliographic-information data banks.

Four recommendations by the authors address potential Federal government actions and private sector initiatives. First, appropriate Federal authorities should seek ways of ensuring public access at the regional level to inspection copies of problem-oriented serial publications. Second, managers of commercial and noncommercial indexing services should ensure better coverage of problem-oriented primary serials. Third, managers of both publicly and privately owned problem-oriented serials should ensure that important access problems experienced by their users are better understood and, when apropriate, should initiate remedial action. Finally, the Federal government should support the development of a specialized research library containing copies of all serial publications dealing with selected social problem areas.

008 Ingerson, Earl, ed.
Department of Geological Science
University of Texas at Austin
Austin, TX 78712

Grant: GN-35328
Date: 1973

PROCEEDINGS OF SYMPOSIUM OF HYDROGEOCHEMISTRY AND BIOGEOCHEMISTRY; Vol. I. Hydrogeochemistry, Vol. II. Biogeochemistry.

Availability: Contact editor

The International Association of Geochemistry and Cosmochemistry has sponsored, organized, and conducted major symposia in various fields of biochemistry and has published the proceedings of these meetings. The Fourth International Symposium, attended by more than 400 scientists from 23 countries and cosponsored by UNESCO and many other international organizations, covered the important fields of hydrogeochemistry and biogeochemistry. The volumes cited here constitute the proceedings of this meeting.

009 Schipma, Peter B., et al.
IIT Research Institute
10 West 35th Street
Chicago, IL 60616

Contract: C-734
Date: October 5, 1973

DESIGN SPECIFICATIONS FOR MANIPULATION OF LARGE DATA BASES.

Availability: Contact authors

The potential users of a large data base, the manner in which they would use it, and an exhaustive statistical study of the data base itself are presented. The Integrated Subject File (ISF) of Chemical Abstracts Service (CAS) was the typical data base. The basic hardware and software requirements for computer searching of this data base are discussed. Although software for searching the ISF is not a product of this program, many algorithms were devised for the experimental work undertaken. Two algorithms are of general value to anyone wishing to process the ISF (or other large file) and are included in an appendix. Survey material and data on the Integrated Subject File are also included in appendixes.

Other publications:

009a Llewellen, Patricia A.
CHARACTERIZATION OF THE POTENTIAL CAS-ISF USER COMMUNITY. American Chemical Society Meeting, Philadelphia, April 1975.

A two-part survey was conducted to characterize the potential Integrated Subject File user community. The survey aimed at providing basic information from a large number of potential users, supported by some very detailed information from a more limited user population. The paper presents detailed data collected from the survey and enumerates various conclusions reached about the user population.

009b Schipma, Peter B.
CHEMICAL ABSTRACTS INTEGRATED SUBJECT FILE STATISTICS. The ASIDIC Annual Convention. Minneapolis, MN, September 1973.

A study which was conducted on the Chemical Abstracts Integrated Subject File is presented. The study was divided into several portions that can be grouped into three major areas: (1) user characteristics; (2) user mechanisms; and (3) data base statistics. From the data collected in these areas, the researchers were able to offer tentative recommendations for search software design. The computer specifications for the software are described and statistics are given for size, length of records, and number of characters in the file.

010 The Society of Research Administrators
The University of California
Irvine, CA 92717

Grant: GN-36158
Date: July 1973

THE JOURNAL OF THE SOCIETY OF RESEARCH ADMINISTRATORS.

Availability: Contact publisher

The Journal of the Society of Research Administrators changed its format in 1973 when NSF funds were received to aid in its publication. At this time, the Journal also began to publish articles by NSF researchers.

The Journal publishes original papers, articles, theses, surveys, and reviews about the administration of research with its other objective being to further the development of professionalism in the field of research administration. The editors strive to bring new techniques and approaches of all aspects of research administration to the attention and scrutiny of the profession. As in other professional journals, the papers printed must bear the criticism of the author's peers. The Journal will print contrary arguments or comments in future issues on any paper published. Readers are requested to submit such critiques.

In an attempt to educate the neophyte entering the profession, the Journal has begun a new section entitled "Basic Guidelines for Research Administrators." From time to time, helpful comments covering various aspects of the research administrator's job are printed in this section.

The Journal announces major invited papers given at the Society of Research Administrators meetings, both national and sectional.

011 Therrien, Charles W.
Electronic Systems Laboratory
Department of Electrical Engineering
Massachusetts Institute of Technology
Cambridge, MA 02139

Grant: GN-36520
Date: August 1, 1973

DATA COMMUNICATIONS FOR AN EXPERIMENTAL INFORMATION-RETRIEVAL NETWORK INTERFACE. 21 pages.

Availability: NTIS, PB 237 975

Various elements of the communications support for an experimental version of the information retrieval network interface, known as CONIT (Connector for Networked Information Transfer) are presented. The CONIT interface will initially connect the Intrex information retrieval system and the MEDLINE system into a network. It will also provide a number of features that the authors believe should be present in the virtual information retrieval system.

The approach consists of providing the CONIT interface with access to each system as if a user of that system were at a terminal. In general, this requires as many separate data line connections to each system as there are simultaneous users of the interface; for economic reasons, it is therefore necessary to keep the number of simultaneous users small. The approach has been prompted by the fact that the MULTICS computer at M.I.T. is connected to the ARPA network (ARPANET) and can communicate with any computer which has a telephone connection to one of the special devices called Terminal Interface Processors (TIPs) supporting terminals in the network. Putting the CONIT interface on a host computer in the ARPA network holds the promise of continued interface development to operational status, especially if some of the information retrieval systems in the experiment join ARPANET as full-scale hosts. Thus, CONIT interface has been developed on MULTICS.

The main disadvantage of connecting to ARPANET through TIPs is the number of separate telephone connections required for multiuser access. MEDLINE is currently maintaining two lines but may increase to five or eight lines. Intrex will initially support only a single line for purposes of experimentation. The report deals with the software on the MULTICS host computer which supports access and communication with the information retrieval systems. The method of connection between the Intrex system and the ARPA network is also described.

012-1 Wang, Paul Tiing Renn
The Computer and Information Science Research Center
The Ohio State University
2024 Neil Avenue
Columbus, OH 43210

Grant: GN-534.1
Date: September 1973

BANDWIDTH MINIMIZATION, REDUCIBILITY, DECOMPOSITION, AND TRIANGULARIZATION OF SPARSE MATRICES. 162 pages.

Availability: NTIS, PB 227 396

A brief historical review of several important techniques permuting sparse matrices into different structures such as the block upper triangular form, bonded form, and almost upper triangular form is presented. These techniques and their problems are shown to be closely related to graph theory, especially to the concepts of connectivity, reachability, and covering. After studying the existing algorithms for permuting sparse matrices, the author develops four algorithms to improve either the speed of computation or storage required and to overcome some of the difficulties in existing algorithms.

012-2 Lay, William Michael

THE DOUBLE-KWIC COORDINATE INDEXING TECHNIQUE: THEORY, DESIGN, AND IMPLEMENTATION. February 1973. 265 pages.

Availability: NTIS, PB 228 282; ERIC, ED 072 826

A refinement of the KWIC indexing technique, the double-KWIC coordinate indexing, which combines immediate secondary access capabilities, the contextual relationships, and constructions of the KWIC indexing technique, is presented. Indexes are thereby produced which approach the usefulness of articulated subject indexes.

The capabilities of the KWIC (key-word-in-context) indexing technique to provide immediate access to all significant words of a title are demonstrated. Secondary concepts must be found by searching for contextual relationships in the text surrounding the keyword. The PERMUTERM index, which is also discussed, provides immediate access to secondary concepts; however, because no syntax information is supplied concerning the relationship between the subordinate and main keywords, false retrievals may occur when the concepts described by the single keywords are not related in the manner expected by a user.

012-3 Young, Carol Elizabeth

DEVELOPMENT OF LANGUAGE ANALYSIS PROCEDURES WITH APPLICATION TO AUTOMATIC INDEXING. April 1973. 310 pages.

Availability: NTIS, PB 227 088; ERIC, ED 078 843

A theoretical framework within which relationships among words are defined and algorithms which have been developed to identify these relationships are presented. The algorithms which have been developed affect four processes: the assignment of each word to a grammatical class, the

identification of phrases and of clauses, and the addignment of case grammar roles. These linguistics analysis procedures are to be used to construct graphical representations of sentences. The graphs are proposed as the basis of a generalized indexing system. Specifically, the problem which this research addresses is the development of procedures which define the relational attributes to words in English text.

013 Woods, Bill M.; John E. Creps, Jr.
Engineering Index, Inc.
United Engineering Center
345 East 47th Street
New York, NY 10017

Grant: GN-28502
Date: August 1973

CONVERSION OF PRODUCTION SYSTEM TO COMPUTER BASED OPERATION (COPS). FINAL REPORT. 34 pages.

Availability: Contact Engineering Index, Inc.

The Engineering Index, Inc. (Ei) has embarked on a 7-year, long-range Transdisciplinary Engineering Information Program (TEIP). Conversion of Production System (COPS) represents Phase I of the TEIP Systems/Technical Development. Some of the objectives of the COPS program are the reduction of time lag from availability of primary material to delivery of end products, reduction of operating costs, and increased customer satisfaction with Ei printed products.

Conversion of production to computer technology has been successful. All Ei products are now being produced from a single master file data base. In addition, there are compatible data base files of Publications in Engineering (PIE) and Subject Headings in Engineering (SHE), both of which have subsequently appeared as published products. PIE has successfully been used to interact with the master file data base to enhance the efficiency of product preparation.

014 Alt, Franz L., et al.
American Institute of Physics
335 East 45th Street
New York, NY 10017

Grant: GN-864
Date: March 15, 1974

INTEGRATION OF PRIMARY AND SECONDARY PRODUCTION SYSTEMS. 133 pages.

Availability: NTIS, PB 244 771

The integration of the American Institute of Physics' (AIP) primary and secondary production systems was achieved through a single keyboarding of the data elements and the use of computer photocomposition techniques, so that a machine-readable file of secondary information was obtained as a byproduct of primary journal production. The data elements keyboarded included the journal citation information, title, author(s) and location(s), full text of the abstract, indexing information, free language key phrases, and the footnote references to other journal articles.

The master tapes are used in primary journal production and journal indexes. The data base is also used to produce the SPIN magnetic tape service used by information centers and Current Physics Titles, a set of computer photocomposed titles arranged by subject in the fields of Solid State, Nuclei and Particles, and Atoms and Waves. Current Physics Microform (CPM) gives full text backup for AIP-published journals on microfilm. Current Physics Advance Abstracts publishes abstracts 2 to 4 months in advance of publication of the journal article. For this publication, indexed abstracts are provided by the authors on special forms which are pasted up to make a camera-ready copy.

Operational programs were modified to exchange magnetic tape information with other services; exchanges were made with Chemical Abstracts Service and the Institution of Electrical Engineers (London).

015-1 Berul, Lawrence H.; Donald W. King; John G. Yates
Westat, Inc; Aspen Systems Corporation
20010 Century Boulevard
Germantown, MD 20767

Contract: C-769
Date: July 1974

EDITORIAL PROCESSING CENTERS: A STUDY TO DETERMINE ECONOMIC AND TECHNICAL FEASIBILITY. 111 pages.

Availability: NTIS, PB 234 959

The concept of the Editorial Processing Center (EPC) which would, by combining the workload of several small publishing operations, be able to provide computer support for typing and editing manuscripts, selecting and routing manuscripts to the appropriate reviewer, and producing type proofs, mailing labels, and camera-ready copy for printing and distribution was studied.

The overall study was subdivided into six major study tasks: functional analysis, baseline study, author-reviewer-subscriber survey, technology analysis, technical design, and economic analysis.

Editorial Processing Centers, as functionally defined in this study, are technically and economically feasible. The economic analysis demonstrated that a maximum of eight small journals or two large ones are required to participate in an EPC in order to result in costs lower than those incurred by the same societies operating independently according to current practice. In addition to the cost savings associated with a more streamlined publishing process, there are clear benefits to society at large in making research findings more quickly available. Also, the byproduct tapes from EPC's should have significant value to the producers of secondary publications and ultimately may be used as data bases for full-text searching.

015-2 Krevitt, Beth I.
EDITORIAL PROCESSING CENTERS. A STUDY TO DETERMINE ECONOMIC AND TECHNICAL FEASIBILITY. Annex Part I. A Baseline Study of Current Journal Practices in the Life Sciences. 136 pages.

Availability: NTIS, PB 234 960

A baseline analysis was made of the current publication processes of scientific journals, their characteristics, and author and readership patterns. In-depth cost and volumetric and organizational data were collected during personal interviews with members of seven American Institute of Biological Sciences societies. A journal characteristics analysis was performed using a random sample of 42 journals from 310 societies. Each journal was analyzed for such characteristics as number of pages per issue, number of

pages per article, size of a page, weight of an issue, and use of special characters. The results included a detailed functional flow diagram of representative large and small journals, descriptions of current practices and journal characteristics, and a cost analysis of individual functions.

015-3 Martin, J. Sperling
EDITORIAL PROCESSING CENTERS. A STUDY TO DETERMINE ECONOMIC AND TECHNICAL FEASIBILITY. Annex Part II. A Review of Relevant Technology to the Publication of Scientific and Technical Journals. 63 pages.

Availability: NTIS, PB 234 961

Technological support of the fundamental Editorial Processing Center (EPC) concept was evaluated. An analysis and review was made of the relevant hardware, software, and techniques applicable to the publication of scientific journals, including data acquisition, phototypesetters, typesetting-oriented computers, and typesetting/composition software. An extensive review of potential manufacturers' literature and compilations of product information were made. The status of technology currently available for EPC's is summarized and trends in critical areas are forecasted. Specific emphasis was given to such problems as editing and typesetting special symbols, chemical and mathematical notation, automatic notation, on-line page layout, and reprocessability.

015-4 Maidens, William A., III
EDITORIAL PROCESSING CENTERS. A STUDY TO DETERMINE ECONOMIC AND TECHNICAL FEASIBILITY. Annex Part III. The Design of Four System Configurations for Publishing Scientific and Technical Journals. 111 pages.

Availability: NTIS, PB 234 962

Four configurations of Editorial Processing Centers (EPC) have been designed, ranging from a Minimum EPC providing the smallest number of functions below which the organization would not be feasible, to a Maximum configuration which performs all the potentially automated functions in an on-line computerized environment. The technical design includes the specification of the required hardware and software as well as basic staffing complement for each configuration. Developmental and operational costs for a fixed production and significant productivity parameters are presented.

015-5 Green, Lois, A.; Susan T. Hill
EDITORIAL PROCESSING CENTERS. A STUDY TO DETERMINE ECONOMIC AND TECHNICAL FEASIBILITY. Annex Part IV. Survey of Authors, Reviewers, and Subscribers to Journals in the Life Sciences. 152 pages.

Availability: NTIS, PB 234 963

A survey of 600 life scientists provided estimates of awareness and usage of various equipment and facilities, including IBM Selectric typewriters and computer terminals. Baseline estimates of time involved in author preparation of manuscripts, typing, revising and retyping, proofing, reviewing, editing, and other functions involved in preparing manuscripts for publication are presented. Average time elapsed from manuscript submission to publication was determined, and the perceived value to scientists of the reduction of the elapsed time with regard to information dissemination discussed. In addition, journal subscribers' indication of their perceived value of improvements in typographic format and/or graphic quality is reviewed.

015-6 King, Donald W.; John G. Yates
EDITORIAL PROCESSING CENTERS. A STUDY TO DETERMINE ECONOMIC AND TECHNICAL FEASIBILITY. Annex Part V. Economic Analysis of Journal Publishing in the Life Sciences. 163 pages.

Availability: NTIS, PB 234 964

Generalized cost models were used to compare the cost of operations between the current journal publishing systems and four alternative Editorial Processing Center (EPC) configurations, with varying conditions of input, process, and output. Sensitivity analyses were performed to determine the impact of changes in the cost of particular parameters. Alternative methods of allocating overhead were analyzed, and the impact of inflation was assessed for a 5-year planning period. The report analyzes the economic aspects of the market-like environment within which journal publishing operates and discusses EPC financial and organizational considerations.

Other publications:

015a Aspen Systems Corporation; Westat, Inc.
EDITORIAL PROCESSING CENTERS: FEASIBILITY AND PROMISE. 70 pages.

Availability: NSF (limited supply)

The potential benefits of editorial processing centers, the evaluations and decisions a publisher must make in deciding on implementing or joining such a center, and anticipated results of the project are described. The monograph was prepared with the help of computer text-processing techniques (described in the same monograph) from original input to the final typesetting of camera-ready page proofs.

015b Green, Lois A.; Susan T. Hill
SCIENTIFIC SOCIETY MEMBERSHIP SURVEY: AVAILABILITY AND USE OF COMMUNICATION FACILITIES AND EQUIPMENT.
Westat, Inc. January 1975. 85 pages.

Availability: NTIS, PB 243 440

A survey among authors, reviewers, and subscribers designed to determine their awareness of modern equipment and facilities which are part of the application of computer technology to journal publishing is presented. This survey was part of a project to study the economic feasibility of applying computer technology to scientific and technical journal publishing. The results of the survey of life scientists were published as Part IV of an Annex to the final report (015-5).

016 BioSciences Information Service of Biological Abstracts
2100 Arch Street
Philadelphia, PA 19103

Contract: C-810
Date: March 1974

A PROJECT TO REDESIGN AND RE-ENGINEER THE BIOSIS SYSTEM.
Vol. I. 266 pages.

Availability: NTIS, PB 243 311

The overall objectives for this work are: to implement a system in which all of the data to produce various secondary services can be derived from one magnetic tape store; to take advantage of developments from other organizations, in particular Chemical Abstracts Service (CAS); to achieve optimal system compatibility, where feasible, with CAS; and to establish a position from which future cooperative activities can be undertaken.

017-1 Buttleman, H. William
The Computer and Information Science Research Center
The Ohio State University
2024 Neil Avenue
Columbus, OH 43210

Grant: GN-534.1
Date: September 1974

SEMANTIC DIRECTED TRANSLATION OF CONTEXT FREE LANGUAGES. 39 pages.

Availability: NTIS, PB 242 854

A formal definition for the semantics of a context-free language, called a phrase-structure semantics, is given. The definition is a model of the notion that phrases have meaning and the meaning of a phrase is a function of its syntactic structure and of the meanings of its constituents. A definition for translation of context-free languages (cfl's) is also presented. A computer algorithm consisting of a finite set of rules which specify how to replace phrases in the source language with semantically equivalent phrases in the target language is described. It is also stated that the key problem of the work is finding the finite set of rules.

017-2 Cohen, D.; M. T. Liu
EMULATION OF COMPUTER NETWORKS BY MICROPROGRAMMABLE MICROCOMPUTERS. June 1974. 24 pages.

Availability: NTIS, PB 242 912

A method of implementing microprogrammable microcomputer systems as a sophisticated tool (emulator) for decreasing the economic risk involved in development of a large computer network is described. Two levels of emulation are proposed for different networking configurations. The INTEL 8080 microprocessors were selected for implementing the systems described. In the special case where mutually exclusive data are processed, the proposed systems can be changed to parallel processing systems for concurrent execution of computer programs at different levels.

017-3 Kirsch, Barry M.
AN IMPROVED ERROR DIAGNOSTICS SYSTEM FOR IBM SYSTEM/360-370 ASSEMBLER PROGRAM DUMPS. June 1974. 67 pages.

Availability: NTIS, PB 235 060; ERIC, ED 092 153

An error diagnostics system for assembler language programs written for the IBM System/360-370 series of computers is described. Although the diagnostics system is not able to determine the precise cause of every possible error, its use should facilitate the process of debugging programs.

The system was written for and tested on the IBM System 370 Model 165 computer operating under OS/MVT (operating system providing multiprogramming with a variable number of tasks) at the Instruction and Research Computer Center of the Ohio State University.

The author has attempted to incorporate into the system all of his knowledge of the various errors that may result in program interruptions on the computer in question, along with the many possible causes of these errors. Information of this type from a number of books and publications has also been included. The logic contained in the programs comprising the error-diagnostics system is by necessity incomplete. It is stated that, although much of the paper is written for the person with some knowledge of the details of the System/360-370 Operating System and its interrupt structure, little background is required to actually use the error-diagnostics package. The reader with little or no experience is referred to the appendix in which the first example given shows all the program and job control language statements necessary for the successful use of the system.

017-4 Reames, C. C.; M. T. Liu
VARIABLE-LENGTH MESSAGE TRANSMISSION FOR DISTRIBUTED LOOP COMPUTER NETWORKS (Part I). June 1974. 14 pages.

Availability: NTIS, PB 242 913; ERIC, ED 092 152

An introduction to loop networks is given with a summary of previous accomplishments in this area. The problems involved in the transmission of variable-length messages are outlined, and the present technique is shown to be inadequate. An improved variable-length message transmission scheme is proposed for distributed loop computer networks, and a conceptual model of its operation is developed. The model illustrates a method by which the nodal interface can delay incoming messages by hardware buffering just long enough for an outgoing message to be placed on the loop; advantage is taken of gaps between messages to clear out the delay buffer and to make room for future outgoing messages. The effects of the proposed technique on message transmission are discussed, and future research is mentioned. An appendix provides some possible hardware realizations of the model.

018 Freeman, James E.; Albert H. Rubenstein
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Grant: GN-40981
Date: November 1974

THE USERS AND USES OF SCIENTIFIC AND TECHNICAL INFORMATION: CRITICAL RESEARCH NEEDS. 54 pages.

Availability: NTIS, PB 237 941

A set of critical research needs and experimental possibilities related to the users and uses of Scientific and Technical Information (STI) are identified and described.

The project proceeded through three stages. In Stage I, a workshop was convened in Denver, Colorado on November 26, 27, and 28, 1973; 21 academic industrial and government people generated and prioritized approximately 100 "critical research issues and potentially researchable questions." Stage II, which occurred between January and March 1974, involved two post workshop evaluations of the original set of issues and questions. In Stage III, from March through May 1974, three participants translated a subset of the critical issues into preliminary designs for potential experimental projects. Results of their efforts are presented in the body of this report.

Participants decided that highest, but not exclusive, priority should be given to research projects that treat marketing aspects of information services and systems. In particular, they recommended that research be done to find more useful ways of categorizing the users of scientific information, to determine more effective means of familiarizing potential users with information services, and to learn how to apply traditional marketing techniques to the design and control of systems and services in this area. Other high-priority research issues selected by participants included determining the relevance of STI to major social problem areas (e.g., energy, environment, transportation), improving the use of information concerning users in the design and management of systems, and assessing the impact of computer innovations on information systems and services. Results of this project should be of value to the entire STI community.

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Grant: GN-873
Date: January 1974

DEVELOPMENT AND IMPLEMENTATION OF A CURRICULUM-BASED INFORMATION SUPPORT SYSTEM FOR HAMLINE UNIVERSITY. 100 pages.

Availability: NTIS, PB 252 428

The impetus for the program was the concern of Hamline University librarians that their information services were becoming progressively less relevant to student and faculty requirements, and that new directions and alternatives needed to be explored and evaluated. An information system developed and implemented at Hamline University that would directly support curriculum-based requirements at Hamline is described.

The program progressed through a series of five phases. The existing information system inadequacies were diagnosed and a new concept was proposed, empirically tested for feasibility, put into effect on a small scale, and used to project requirements and costs of expanded operations. Finally, a large-scale system was implemented that served every member of the Hamline faculty and student body. The central features of the system were contained in the role of the information specialist who served as a link between the information requirements generated by the curriculum and available information resources. The specialists worked with professors to construct a task model of each supported course. These task models were used both as the basis for deriving information needs and as a reference for the evaluation of products and services provided.

Data collected during the experimental and implementation phases of system development indicated its effectiveness. Librarian-user interactions were 3 times greater for students and 14 times greater for faculty than occurred in the traditional library operation. The amount of material provided by the new system from off-site resources represented a tenfold increase over the traditional system, and the judged effectiveness of disseminated materials to course-related tasks was on the order of 35-88%. At a qualitative level of evalution, information specialists' contribution to the educational processes was considered substantial. Professors expanded the range of materials included in their courses, and in some instances modified the format of the course due to the availability of the information specialist. To some extent the information specialist became a teaching partner of the professor in

enriching the educational experience of the students.

020 Overhage, Carl F. J.; J. Francis Reintjes
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Grant: GN-774
Date: 1974

PROJECT INTREX: A GENERAL REVIEW. Information Storage and Retrieval, Vol. 10, No. 5, 1974, pages 157-188.

Availability: ERIC, EJ 101 203

A comprehensive review of the experimental information storage and retrieval system developed by Project Intrex is presented, together with a description of major results and conclusions that were derived through use of the system. Salient features of the Intrex system included an augmented catalog stored in an on-line interactive computer in combination with full-text storage on microfiche. Guaranteed access to full text at remote locations was provided through use of an automatic fiche storage and retrieval system that was computer-controlled. Discussed in the paper are the details of the catalog structure, user experiments, economic studies, and information system networking.

Other publication:

020a Marcus, R. S.; P. Kugel; A. R. Benenfeld
CATALOG INFORMATION AND TEXT AS INDICATORS OF RELEVANCE. Journal of the American Society of Information Sciences. In press.

021 Martin, Thomas H.
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Grant: GN-36160
Date: September 1974

A FEATURE ANALYSIS OF INTERACTIVE RETRIEVAL SYSTEMS. 104 pages.

Availability: NTIS, PB 235 952

Command language features of 11 different on-line information retrieval systems are presented in terms of the functional needs of a searcher sitting at a terminal. The purpose of the analysis was to bring system designers together and to focus their attention upon similarities and differences in existing user interfaces.

A 3-day workshop was held at Stanford University April 23-25, 1973. Representatives of each of the 11 systems, a five-man panel of experts, and several invited guests met for intensive discussions and system demonstrations. In preparation for the workshop, user manuals were solicited from each of the systems' representatives and each representative was visited for half a day. The manuals were used to extract much of the material that appears in the report, and the site visits were used to complete information gathering and to question representatives regarding the user population.

It was concluded that designers know little about the habits and characteristics of individual users. In most cases, clients were known only by an account number. Only gross generalizations were available regarding whether end users were carrying out their own searches, whether searchers were frequently switching between data bases, or whether they tended to use video terminals instead of teletypes. After the site visits and before the workshop, matrices were drawn up summarizing the degree to which each of the 11 systems incorporated various features. At the workshop, the matrices were used to structure the discussion between designers. Revised editions of the matrices have been included as an appendix to the report; system representatives have reviewed chapters of the report dealing with their systems and have made revisions so that the report accurately states the status of their systems as of April 1973.

022-1 Niehoff, Robert T.; W. D. Penniman; R. L. Little
VARIOUS RESEARCH TASKS RELATED TO ENERGY INFORMATION AND DATA ACTIVITIES--TASK 2 NATIONAL ENERGY INDEXING SCHEMES--CHARACTERIZATION OF PROBLEM. Final Report. November 1974. 53 pages.

Grant: GN-42243

Availability: NTIS, PB 240 423

While the value and role of thesauri continue to be vigorously debated between those who have thesauri and those who did not, it remains a fact that for many abstracting,

indexing, and data-base services in this country, thesauri, subject heading lists, etc. are fundamental tools. The question is what can be done for users who must cope with multiple data-base systems and networks, each with its own vocabulary. Integration of individual vocabularies is a first step toward resolving incompatibilities and assisting users who can avail themselves of multiple data bases.

The objectives of this task were to identify, compile, and integrate existing energy vocabulary from 11 systems, both government and nongovernment, into a common indexing and retrieval guide; to identify and examine major vocabulary-related problems which arise when searching to prepare a prototype energy-vocabulary retrieval-conversion guide to serve as a model for demonstrating the compatability, or lack thereof, among various controlled vocabulary systems and to stimulate interest in achieving intersystem compatability.

022-2 Battelle Energy Information Center
ENERGY R&D DATA WORKSHOP. SUMMARY REPORT. National Bureau of Standards, Gaithersburg, MD, May 6-7, 1974. 37 pages.

Availability: NTIS, PB 237 493

The Office of Science Information Service, National Science Foundation conducted an Energy R & D Workshop at the National Bureau of Standards. The program, presented in cooperation with the NSF Directorate for Research Applications, the National Bureau of Standards Office of Standards Reference Data, the Atomic Energy Commission and Battelle Memorial Institute, was a follow-up of an earlier workshop held on December 14, 1973 which was devoted to energy information. The Workshops provided a forum at which NSF personnel and others heard ideas and suggestions from a cross-section of persons concerned or involved with energy research and development information and data. There were 143 participants at the Workshop representing the generators, processors, publishers, and users of energy data. This summary report includes papers from participants and proceedings of a panel discussion entitled "Emerging R & D Programs in Energy: The Role of Data Dissemination Programs."

022-3 Kohn, Robert S.; Joseph B. Miller
INVENTORY OF ENERGY RESEARCH AND DEVELOPMENT INFORMATION RESOURCES IN THE U.S October 15, 1974.

Availability: Contact American Society for Information Science

This publication is a reference tool for scientists, engineers, and others concerned with energy research and development and lists potentially applicable sources of information within the United States. Very few of these resources are dedicated solely to energy; most deal primarily with subjects or missions that contain energy-related components.

The guidelines established for inclusion of an information resource in this publication are highly restrictive. First, the resources contain information oriented toward research and development; resources concerned primarily with such elements as energy policy, economics, supply, demand, consumption, imports/exports, allocation, and rationing are not included. Second, the energy-related information content of each resource is substantive enough, according to the resource contact's judgment, to be useful to a researcher. Finally, each resource is generally available to the user community; those with some access restrictions are also listed.

The inventory consists of three main sections: Information Resources; Annotated Publications; and Indexes. It is published in book form by the American Society for Information Science under the title "Energy Information Resources--An Inventory of Energy Information and Data Resources in the Continental United States, Hawaii and Alaska."

022-4 Liston, David M., Jr.; John W. Murdock; Immanuel J. Klette
VARIOUS RESEARCH TASKS RELATED TO ENERGY INFORMATION AND DATA ACTIVITIES--TASK 4, PRIORITIES ANALYSIS. November 15, 1974. 42 pages.

Availability: NTIS, PB 240 4424

The objective of this task was to provide the National Science Foundation with an analysis of current energy research and development information activities and problems. The study also generated a list of priority actions for NSF's consideration in the field of energy research information. The work involved three major steps. First, a summary of each of three concepts--energy policy, science policy, and information policy--was compiled. Second, these three sets of policy concepts were integrated to form general energy information policy concepts. Third, suggested priority actions were deduced from these policy considerations.

Among recommended actions of first priority are: (1) surveillance of data bases and libraries to evaluate the comprehensiveness of coverage of energy research information coverage; (2) determination of an appropriate data flagging and/or tagging methodology to facilitate efficient retrieval of energy-related data from bibliographic data bases; and (3) the conduct of studies on how to achieve effective interagency (or interorganizational) cooperation in seeking solutions to the energy crisis and energy information problems.

023 Reintjes, J. Francis; Richard S. Marcus
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Grant: GN-36520
Date: June 30, 1974

RESEARCH IN THE COUPLING OF INTERACTIVE INFORMATION SYSTEMS. FINAL REPORT. 58 pages.

Availability: NTIS, PB 237 974; ERIC, ED 094 758

Results of an 18-month research effort in the coupling of interactive information systems are described. The research was motivated by a concern that information systems now appearing in operational environments will not be effectively utilized because of an inability of users and information specialists to master them.

The research centered on development of the concept of a translating computer interface through which the networking of heterogeneous interactive information systems may be achieved. Particular concepts and techniques which have been investigated are the virtual system concept by which users perceive the network as a single homogeneous system; a common command language synthesized from a language of basic information retrieval functions; a master index and thesaurus which lists the vocabulary of the separate data bases along with index term interrelationships and counts; and a common bibliographic data structure in which the data elements for the bibliographic information are hierarchically interrelated among different data bases. In addition to the theoretical study of the problem, an experimental interface has been developed that connects the MEDLINE and Intrex retrieval systems via ARPANET communication links and performs some of the networking functions of the virtual system.

While a basis for research into the coupling of

retrieval systems has been laid, it is felt that much additional work is needed, including the further elaboration of the techniques; their implementation in additional demonstration systems which connect several systems and several data bases and cover most retrieval functions; the testing and evaluation of these systems with real users; and the development of more effective computer-to-computer communications.

024 Stevens, John G.; Virginia E. Stevens;
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Grant: GN-36935
Date: 1974

MOSSBAUER EFFECT DATA INDEX.

This issue of the Mossbauer Effect Data Index, the result of the cooperative efforts of the past and present groups, completes the series to date. More than 1600 articles collected and cited for 1966-1968 represent a large segment of the total Mossbauer literature which was not previously covered. Included are articles which have been published in journals recognized by Chemical Abstracts' Source Index. This means that reports, abstracts, and preprints are not included. The reason for this decision has been two-fold. First, collecting all such publications is an impossibility, and second, material of this type will eventually be converted to bona fide articles if it has real merit, and will then be included in the Index.

It is felt that the importance of a reliable bibliographic tool of this sort is difficult to overemphasize. It is a tremendous time saver for the individual research worker, an inestimable boon for the writer of review articles, and a tool by which duplication of effort for proper documentation can be avoided.

Submission of relevant reprints to the Data Center guarantees inclusion in the Index.

025 Watson, Peter G.; R. Bruce Briggs
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Grant: GN-827
Date: December 31, 1974

CENTER FOR INFORMATION SERVICES. FINAL REPORT. 148 pages.

Availability: NTIS, PB 241 206

The Center for Information Services (CIS) was designed to operate as an extension of the normal activities of the Library by augmenting both the media handled and the methods of operation. CIS undertakes the acquisition, storage, and processing of computer-readable media, such as magnetic tape, in terms of service to users; it also offers both a current awareness service of its own from these tapes, and an interface with other available information sources. Among the goals established for the design of the CIS services are: (1) that the system be operational and designed to meet the daily needs of the University community; (2) that it be easy to use; and (3) that it be a potential node in an interuniversity network.

Development of the Center took place in four phases spanning 8 years. Phase I was devoted to a general survey of the newly emerging activity of computerized information storage and retrieval. In Phase II requirement specifications were drawn up through interviews and discussions with users and library personnel. A detailed design and a prototype model were then prepared. The prototype operation began in Phase III. The basic software system was completed, operational user services were developed, and transition of project responsibilities to the Library was initiated. Finally, in Phase IV formal transfer of the responsibility of the CIS project to the Library took place.

It is suggested that for CIS the level of usage and overall growth rate of usage is more than satisfactory. With its current data base offering and funding level, CIS already has large user communities at UCLA and UC Berkely. As for other measures, it is felt that system performance reflects a generally well-behaved system. The profiling language for the system is considered superior to any profiling language available at time of publication. CIS had received numerous comments from profile analysts praising its capabilities and ease of use. Finally, while it is not appropriate to draw any firm conclusions from data presented in the report, one sees that generally there is satisfaction with CIS services. It is expected that larger user samples would reflect the same user attitudes toward CIS.

026 Ackoff, Russell L.; Martin C. J. Elton; James C. Emery
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Grant: GN-41833
Date: September 1, 1975

THE SCATT REPORT--A TENTATIVE IDEALIZED DESIGN OF A NATIONAL SCIENTIFIC COMMUNICATION AND TECHNOLOGY TRANSFER SYSTEM. 203 pages.

Availability: NTIS, PB 247 242

A design for a National Scientific Communication and Technology Transfer (SCATT) System that would, if implemented, offer to the community of scientists and technologists a viable opportunity for communication is described. To understand the design methodology, it is important to understand the process of "idealized design." When redesign of one part of a system is undertaken independently of the redesign of other parts, the range of feasible possibilities is limited. Idealization is the redesign of the system on the assumption that there are no constraints except two: the redesign may not involve any technology which is not known to be feasible, and the system must be capable of operation if it does come into existence.

The work has consisted of two overlapping phases. The effort began with the collection and synthesis of available information about the current SCATT System. Secondly, the idealized redesign was produced by the project team and disseminated widely for criticisms and suggestions. In this way, several versions of the design were prepared. The system redesign, with its technological and economic requirements and international extensions, was presented in detail.

The system outlined would provide the information producer with considerable freedom in describing his product, and it would provide the user with similar freedom in describing what he wants and in designing the search for it. There is nothing in the specifications of the SCATT System that is beyond the technological state of the art. The economic design indicates how the system would support itself, how it would price its services, and how users could be subsidized.

SCATT, as redesigned, would provide more services more rapidly than is currently possible, enable users to access

the system from their office or building, and allow a user to both tailor the system and freely design his own approach to a search.

Other publications:

026a Ackoff, Russell L., et al.
THE SCATT REPORT: DESIGNING A NATIONAL SCIENTIFIC AND TECHNOLOGICAL COMMUNICATION SYSTEM.
Philadelphia, University of Pennsylvania Press, 1976. 173 pages.

An idealized design, expressed both in diagrams and in sequential verbal components, envisioning a flow of information on a national scale from all possible points or origin to all possible points of application is provided.

To focus the planning process, work was performed within the limits of present technology. Flexibility rather than reduction of choice was sought through provision for storage in multiple formats and provision for subsidized use to ensure access to the system. It is hoped that the design, as a good first approximation of what is needed, will mobilize a large number of relatively autonomous subsystems of the current network into a collaborative effort.

026b Davis, Peter; R. Edward Freeman
TECHNOLOGY ASSESSMENT AND IDEALIZED DESIGN: AN APPLICATION TO TELECOMMUNICATIONS. Proceedings of the III NATO Symposium on Telecommunications, New York, Plenum Press, in press.

026c Sachs, Wladimir
AN APPROACH TO ASSOCIATIVE RETRIEVAL THROUGH THE THEORY OF FUZZY SETS. Journal of the American Society for Information Science, Vol. 27, No. 2, March-April 1976, pages 85-87.

The theory of fuzzy sets was used to provide rigorous formulation of the problem of associative retrieval. A measure of association (an association factor) between the user's request and the document descriptions is computed; it is called here the Similarity Index. When the Similarity Index between a document's description and a user's request is above a certain value specified by the user, the document or its surrogate is retrieved. The items retrieved are

usually ranked according to their association with the request. A description of associative retrieval offered is independent of the particular formula used for computation of the Similarity Index. It may be formalized by means of the notion of fuzzy set, which is briefly introduced.

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Grant: SIS 75-14767
Date: December 1975

SCIENTIFIC AND TECHNICAL INFORMATION SERVICES IN EIGHT LATIN AMERICAN COUNTRIES: DEVELOPMENT, TECHNICAL ASSISTANCE, OPPORTUNITIES FOR COOPERATION. 170 pages.

Availability: NTIS, PB 253 202

This study provides information concerning the recent initiatives taken to plan science information sources, the priority needs which exist, the actual and potential strategies for technical assistance, and the opportunities for cooperative programs to be undertaken by NSF in conjunction with institutions in the eight Latin American countries.

In gathering the information, three limitations were observed. The study covered only eight countries which were generally at a more advanced level than their neighbors. Information from and about the eight countries was obtained mainly from publications, correspondence, and interviews in the United States. International travel was extremely limited. The study was not exhaustive; rather, it attempted to identify the principal developments and trends in each of the countries.

Overall, four areas are covered. A country-by-country review of recent progress in the planning, development, and operation of science and technology information services is presented. The scientific and technical information support programs of the principal agencies lending technical assistance are reviewed, including both international and national agencies. The report identifies optional strategies which may be followed in the provision of effective technical assistance programs to Latin America, with particular emphasis on activities which may be undertaken cooperatively. The report presents a proposal of specific program initiatives which could be followed by NSF in the light of the study's considerations.

028 Adams, Scott; Judith A. Wendel
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Grant: DSI 74-12167
Date: 1975

COOPERATION IN INFORMATION ACTIVITIES THROUGH INTERNATIONAL ORGANIZATIONS. In Carlos A. Cuadra, ed. Annual Review of Information Science and Technology, Vol. 10, Chap. 9. American Society for Information Science, 1975, pages 303-356.

The role played by international organizations in stimulating and providing channels and mechanisms for international cooperation in the processing, sharing, and reviewed. Intergovernmental and nongovernmental international organizations are discussed.

029 Bayer, Bernard
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Grant: GN-27458
Date: December 1975

THIRD ANNUAL REPORT OF THE MECHANIZED INFORMATION CENTER. FEBRUARY 1, 1973 THROUGH JANUARY 31, 1974. 192 pages.

Availability: NTIS, PB 252 855

The main goal of the Mechanized Information Center (MIC) is to efficiently and effectively use machine-readable data bases to provide computer-based information services for students and faculty members of the Ohio State University and for outside organizations. In doing so, MIC is actively making the collection of the Ohio State University Libraries more accessible to, and opening up new sources of information for, all patrons.

The third year, which is described in detail in this report, has been a transition from the developmental first and second phases to an expected fully operational fourth phase. During this year of expanded services, MIC performed nearly 400,000 searches; faculty associates were responsible for the pure research activities.

MIC sent out more than 3,000,000 bibliographic

references of journal articles, book titles, conference papers, and government reports to people using the MIC services during the year. One noticeable impact of the MIC services on campus has been the increased demand for government reports by students and faculty members. The increased acceptance of computer-based services has made itself felt in the increased demand for other services of The Ohio State University Libraries, such as document delivery through the interlibrary loan network. The number of current awareness profiles in the MIC systems reached 3,208 by the end of January 1974, up 54% from the previous January. Five current awareness services were being offered, with multidisciplinary current awareness the most widely used. The report details the performance of the information service functions and the computer systems used in the Center.

Other publications:

029a Bayer, Bernard, ed.
FINAL REPORT OF THE MECHANIZED INFORMATION CENTER. FEBRUARY 1, 1971 THROUGH JANUARY 31, 1975. In press.

029b Stern, Louis W.; C. Samuel Craig; Anthony J. LaGraca
PROMOTION OF INFORMATION SERVICES: AN EVALUATION OF ALTERNATIVE APPROACHES. Journal of the American Society for Information Science, Vol. 24, No. 3, May-June 1973, pages 171-179.

The promotion of information services, specifically the formation and subsequent evaluation of different promotional programs for selective dissemination of information (SDI) services provided by the Mechanized Information Center (MIC) at The Ohio State University is discussed. Three programs--opinion leadership, "blitz," and telephone solicitation-- were developed. Data were collected to show for each program: (1) the level of market penetration achieved; (2) the level of user satisfaction generated from the service; (3) the effect of the various media employed; and (4) cost-effectiveness. Data analysis focused on a determination of the most effective methods to promote SDI services.

030 Benenfeld, Alan R., et al.
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Grant: 73-08366
Date: February 28, 1975

NASIC AT MIT. FINAL REPORT. 98 pages.

Availability: NTIS, PB 241 311; ERIC, ED 107 226

Computer-based reference search services to users on a fee-for-service basis at M.I.T. continued as the first, and experimental, node in the development of the Northeast Academic Science Information Center (NASIC) under a New England Board of Higher Education (NEBHE) program. In this report, development of a training program for information specialists and of training materials is described.

Testing, user surveys, and 15 months of operational experience showed that a moderate but growing demand exists for computer-based reference search services. It is stated that, although cost affects the class of user, it is only one of many factors that influence a person's decision to use the service. The authors feel that promotional efforts need to be very intense, both to increase general awareness of the service and to turn awareness into actual use; in addition, many different promotional mechanisms are needed. The best are considered to be oriented toward the immediate, personal needs of the potential user.

It was found that searches are often interdisciplinary, requiring several sources, so that information specialists need extensive training and practice in searching to attain desirable levels of competence. Operation of the service has also shown that integration of these services within the library environment may require organizational and staffing accomodation in addition to the commitment and enthusiasm of participants.

Other publications:

030a Benenfeld, Alan R.; Mary E. Pensyl; Richard S. Marcus USER RECEPTIVITY TO FEE-FOR-SERVICE ON-LINE SEARCH FACILITY IN A UNIVERSITY COMMUNITY. Proceedings of the 38th Annual Conference, Vol. 12. American Society for Information Science, October 26-30, 1975, pages 151-152.

A survey to determine user receptivity to

fee-for-service on-line search facility in a university community was conducted.

Over 80% of users in this survey were favorably disposed to the quality and cost-effectiveness of the service. It is felt that practically all nonusers are potential users under the proper circumstances. It was determined that cost continues to be of major concern and the overwhelmingly positive response to the worth of the service is still a separate issue from how potential users obtain funds to pay for service. It is felt that publicity efforts need to be very intense; potential users need not only to hear about the service but also to be shown its cost-effectiveness (as actual users find out).

030b Pensyl, Mary E.; Alan R. Benenfeld; Richard R. Marcus
TECHNIQUES USED TO PROMOTE A FEE-FOR-SERVICE ON-LINE SEARCH FACILITY IN A UNIVERSITY COMMUNITY.
Proceedings of the 38th Annual Conference, Vol. 12, American Society for Information Science, October 26-30, 1975, pages 153-154.

Specific promotional techniques which have been used at M.I.T. to alert users to the availability of on-line services are introduced. The single most effective educational tool developed has been the live, on-line demonstration of the service. One successful large-scale demonstration was an all-day event called an Information Bazaar which featured free, 5-minute searches to all visitors from M.I.T. In general, the more personalized the promotional effort, the better the results.

031 Wax, David M.; Patricia E. Vaughan
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Grant: SIS 73-08366, GN-37296
Date: December 1976

NORTHEAST ACADEMIC SCIENCE INFORMATION CENTER--NASIC. FINAL REPORT. 117 pages.

Availability: NTIS, PB 267 758

The Northeast Academic Science Information Center (NASIC) program is a unique experiment in the utilization of a regional organization to develop an intermediary role in the process of providing machine-readable bibliographic search services to the academic research community. The

initial impetus was the desire of the New England Research Applications Center and the search operation at M.I.T. to expand their programs for marketing computerized information services to the academic community. NASIC was intended to become an intermediary between these two centers and the academic users in the hope of increasing academic use of existing information resources.

The developers of NASIC hoped that the program could function in four major areas--the training of information personnel in the use of computer terminals and systems, administrative consulting with university members, user education, and vendor negotiation. As the program grew, the staff attempted academic marketing of NASIC's services. The Center felt that its primary responsibility lay in advising and providing consultation services to member universities. To this end, a user manual "NASIC Search Aids," containing multisystem and multidata-base coverage was designed and printed.

NASIC's efforts to bring advancing technology to its participants included the training of Information Services Librarians at almost all of the major academic institutions in the Northeast. Training, administrative, and reference materials, the latter two of which received distribution well beyond the community of direct participants, were developed. Of particular importance were the reference materials which served as models and, in some cases, major components for similar materials later developed by the commercial search service vendors.

Other publications:

031a Miller, Ronald F.; David M. Wax
NELINET, NASIC, AND THE ACADEMIC LIBRARY USER. In E. J. Josey, ed. New Dimensions for Academic Library Service. Metuchen, New Jersey, The Scarecrow Press, Inc. 1975. Pages 256-267.

In this essay, the constituency of the academic library is regarded as post secondary level students, teaching and research faculty, administrators, and other users for whom special arrangements have been formalized. The latter category of user includes off-campus individuals as well as private and public institutions. This chapter is an overview of the NELINET and NASIC programs as related to the academic user.

031b Northeast Academic Science Information Center. NASIC SEARCH AIDS (1975-1976). 1976.

The NASIC Search Aids have been designed for the trained information services librarian. The DIALOG and ORBIT system sections present the commands and special searching features of each system. The data base section is arranged alphabetically. For each data base there is a Quick Reference Chart followed by a page of notes. The book is published in loose leaf form to facilitate updating.

031c Wax, David M.
NORTHEAST ACADEMIC SCIENCE INFORMATION CENTER (NASIC), YEAR 2 REPORT, MARCH 1974 to FEBRUARY 1975. April 1975. 177 pages.

Availability: NTIS, PB 241 312

In its second year of activity, the NASIC program of the New England Board of Education assisted 18 universities and colleges in the Northeast in the implementation of local capabilities to provide computer-based reference services. Of substantial importance was the effort devoted to the development of training material related to both search systems and data bases. The report includes an appendix describing the work of the M.I.T. libraries and Electronic Systems Laboratory under contract to the New England Board of Education.

031d Wax, David M.; R. D. Morrison, Jr.
NORTHEAST ACADEMIC SCIENCE INFORMATION CENTER (NASIC). PHASE I REPORT. May 1974. Vol. I, 54 pages; Vol. II, 316 pages; Vol. III, 287 pages; Vol. IV, 202 pages.

Availability: NTIS, PB 234 997 (Vol. I), PB 234 998 (Vol. II), PB 234 999 (Vol. III), PB 235 000 (Vol. IV)

The NASIC program was conceived by the New England Board of Higher Education to promote the increased and more effective use of machine-readable, bibliographic information resources by the academic community of the Northeast. Volume I documents the first year's activities of NASIC which were directed toward implementing computerized search capabilities in university libraries. NASIC has developed through an experimental service operation at the M.I.T. library which offered its knowledge and experience to assist other libraries in the implementation process. This knowledge includes programs of training for library staff members to act as a knowledgeable interface between user and

search system, activities directed toward user education and service promotion, and recommended procedures for effective service provision. Volume II contains a detailed report of the experimental service implementation at M.I.T. and a contracted study of cost-effectiveness considerations. Volume III includes the reports of the study on the feasibility of marketing bibliographic and census services to academic users and a survey of timesharing organizations. Volume IV includes a report prepared by NASIC, the Association of Research Libraries and M.I.T. on a national survey of information processing centers. This volume also contains a bibliography and two papers discussing the role and functions of NASIC.

032 Carmon, James L.
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Athens, GA 30602

Grant: GN-41236
Date: May 1975

MODEL THE USER INTERFACE FOR A MULTIDISCIPLINARY BIBLIOGRAPHIC INFORMATION NETWORK. 305 pages.

Availability: NTIS, PB 242 964

This research focuses on an analysis of information-seeking behaviors of users at two university-based information systems--one at the University of California at Los Angeles and the other at the University of Georgia. It represents a recognition, based on actual operational experience, of the critical nature of the user interface to computer-readable information resources. The purpose was to identify and to formalize the procedures that a reference librarian or information specialist employs in negotiating user questions in order to determine if these procedures could be programmed for automated systems.

The work was conducted in two phases. During the first phase, the five major functional steps of the reference process were investigated to collect both descriptive and quantitative data concerning query formulation, question translation, strategy formulation, search execution, and relevance judgment. The second phase, based on data gathered during the first phase, was development of a user-interface model and a projected network model.

The existing model produced as a result of the descriptive research performed in this study does not agree with most of the literature published in this area, which tends to represent the user interface as a linear sequence

of activities. This study has found that the interface for the two search centers is not linear, is highly adaptive, and has an important instructional component. Another significant finding is that the intermediary is an integral component of the interface and is essential to its adaptive capability. The proposed network model is an extension of the existing model and retains the salient characteristics. The provision for two interfaces to the network hopefully will enable user centers to retain the existing model of the user interface and thus isolate the user, to a large degree, from perturbations within the network system.

033 Clayton, Audrey; Norman Nisenoff
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1001 North Highland Street
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Grant: GN-42204
Date: October 20, 1975

THE INFLUENCE OF TECHNOLOGY UPON FUTURE ALTERNATIVES TO THE SCIENTIFIC AND TECHNICAL JOURNAL. FINAL REPORT (3 volumes). 197 pages.

Availability: Contact author

The research team set out to identify technological factors which might affect selection of potential alternatives to the conventional journal. In order to investigate the contribution of technology, it was necessary to examine what does exist; what the objectives of the current journal are; what functions it successfully performs; and the manner in which the task of meeting these objectives is accomplished. The primary emphasis throughout the work was on possible system developments, but an essential subtask was to consider system desirability, because the formulation of system objectives results in a set of criteria which may later be applied to evaluate system performance.

In the report, a review of current problems in the journal medium are described, and a technological forecast of relevant parameters over the next 25 years is detailed as part of the current investigation into viable options. Alternative systems of communication are postulated which could fulfill the journal function, including audiotape, two-way television, audiotape/disk with slides or microform, programmed television, and printed materials. These media and others are analyzed in terms of relevant subtechnologies in order to determine limiting factors.

It was found that communication of scientific and technical information is not hardware limited. In the course of the study, the researchers identified a wide variety of problems connected with the scientific journal in all its aspects, from the initial generation of articles to the storage and retrieval of the completed, documented form. The study recommends that the government supply active support to the selection and implementation of an evolutionary system to augment and ultimately replace the journal as it now exists. Such support should be aimed at identification of a system(s) of optimum effectiveness (evaluated in terms of criteria yet to be defined); the minimization of the costs of system conversion; and the equitable distribution of costs among interest groups. Support should be accompanied by parallel efforts to ameliorate the organizational and other problems not responsive to system modification.

034 Creps, John E., Jr.; Mary Ellen Padin
Engineering Index, Inc.
United Engineering Center
345 East 47th Street
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Grant: GN-36337
Date: August 1975

COMPUTERIZED PRODUCTION OPERATING SYSTEM EXTENSION (COMPOSE). FINAL REPORT. 29 pages.

Availability: Contact Engineering Index, Inc.

COMPOSE is Phase II of Engineering Index's Transdisciplinary Engineering Information Program (TEIP). The objective is not to simply mechanize the production system, but to develop a more powerful bibliographic tool for the engineering profession. The overall objectives of COMPOSE are to modify and extend input and output operations, to improve quality control, to increase capacity, and to increase efficiency throughout the system.

035 Fry, Bernard M.; Herbert S. White
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Grant: GN-41398
Date: November 1975

ECONOMICS AND INTERACTION OF THE PUBLISHER-LIBRARY

RELATIONSHIP IN THE PRODUCTION AND USE OF SCHOLARLY AND RESEARCH JOURNALS. 417 pages.

Availability: NTIS, PB 249 108

The purpose of this study is to report on the viability of the journals system for communicating scholarly and research information. Overall, it examines the economics of the interaction between the publisher/library components in this system and seeks to identify the separate and interdependent problems of each. The study focuses on areas of common concern and the possible economic consequences of unilateral action taken by either publishers or librarians without careful consideration of the impact upon the other group and the communications system as a whole.

The specific objectives which governed the conduct of the study included: (1) the gathering of data in the principal areas of economic interaction between publishers and/or producers and libraries as customers for scholarly research journals; and (2) the development of these data into proposed joint actions aimed at achieving cooperative and reasonable results agreeable to both communities. Data has been collected for the 5-year period, 1969-1973, as a basis for analysis and interpretation. Emerging issues and trends were identified and evaluated for their possible future impact.

If the present economic system were left to its own devices, it appears that a certain amount of journal attrition would take place, and that this attrition would be based largely on qualitative or needs priorities, at least as perceived by the libraries making purchase decisions. The imposition of a laissez-faire system, under which journals would survive or perish based on the decisions of the marketplace, is welcome by certain major libraries and even some publishers. However, there is evidence that such a simplistic approach would do considerable harm to the maintenance of a balanced environment. Some sort of additional funding input to the total economic model is required, and this input must come through the subsidizing, probably from the Federal government, of the library making the purchase, the publisher supplying the publication, or the author who is disseminating his research findings.

Other publications:

035a Fry, Bernard, M.; Herbert S. White
PUBLISHERS AND LIBRARIES: A STUDY OF SCHOLARLY AND RESEARCH JOURNALS. Lexington, MA., D.C. Heath and

Company. 1976. 166 pages.

The purpose of this study is to report on the viability of the journal system for communicating scholarly and research information. Overall it examines the economics of the interaction between the publisher and library components in this system and seeks to identify the separate and interdependent problems of each. Emerging issues and trends are identified and evaluated for their possible future impact. When supported by data and information derived from the study, conclusions and recommendations are offered, aimed at possible solutions or processes for stabilizing the present deteriorating situation and the consequent drift toward a general crisis in journal communication.

035b White, Herbert S.
ECONOMIC INTERACTION OF SCHOLARLY JOURNAL PUBLISHING AND LIBRARIES DURING THE PRESENT PERIOD OF COST INCREASES AND BUDGET REDUCTIONS: IMPLICATIONS FOR SERIALS LIBRARIANS. The Serials Librarian, Vol. 1, No. 3, Spring 1977, pages 221-230.

A recently completed study by the Indiana University Graduate Library School Research Center investigated the economic interaction between U.S. publishers of scholarly and research journals and the libraries which, with frozen or decreasing budgets, are attempting to provide adequate serials coverage and continuity, while also meeting other budgetary needs. This paper presents some of the study's findings concerning the magnitude of the problem, as reported by over 400 libraries for the years 1969-1973. It also examines the dramatic shift in fund allocations from the book to the serials budget in academic libraries, and reports the priorities established within the serials acquisition process where alternative decisions concerning acquisition, retention, and cancellation had to be made.

035c White, Herbert S.
LIBRARY MANAGEMENT IN THE TIGHT BUDGET SEVENTIES: PROBLEMS, CHALLENGES AND OPPORTUNITIES. Bulletin of the Medical Library Association, Vol. 65, No. 1, January 1977, pages 6-12.

This paper examines changes in the management of university, special, and medical libraries brought about by the budget curtailments that followed the more affluent funding period of the mid-1960's. It deals with misconceptions that have arisen in the relationship between publishers and librarians, and differentiates between the

priority perceptions of academic and of special librarians in the allocation of progressively scarcer resources.

035d White, Herbert S.
PUBLISHERS, LIBRARIES, AND THE COSTS OF JOURNAL SUBSCRIPTIONS IN TIMES OF FUNDING RETRENCHMENT. The Library Quarterly, Vol. 46, No. 4, October 1976, pages 359-377.

The Indiana University Graduate Library School examined the economic interaction between libraries and publishers of scholarly and research journals for the period 1969-1973. Drawing from the findings of the study, the validity of librarians' fears of growth in the number of journals published and publishers' profits, and the fears of publishers of unlimited photocopying in libraries are examined. The complex price structure of journal photocopying in libraries is examined. The complex price structure of journal subscriptions, their increasing cost, and the problems these pose both to publishers and librarians are discussed. How libraries allocate their budgets is also examined. The inherent economic problems of publishers and librarians are discussed, and library budget allocations are examined.

035e White, Herbert S.; Bernard M. Fry
ECONOMIC INTERACTION BETWEEN SPECIAL LIBRARIES AND PUBLISHERS OF SCHOLARLY AND RESEARCH JOURNALS: RESULTS OF AN NSF STUDY. Special Libraries, Vol. 68, March 1977, pages 109-114.

This paper focuses on information gathered in 1969-1973 concerning the growth and pricing trends of research journals, particularly as these pertain to journal purchase in special libraries. It examines budget growth and allocation in special libraries, fiscal imbalances created, and what special libraries have done about these problems. Finally, it projects future concerns and difficulties, and touches on some alternatives.

035f White, Herbert S.; Elizabeth Johnson
CHANGING PATTERNS IN SCHOLARLY AND RESEARCH JOURNAL POPULATIONS: GUIDES FOR MANAGERS. Proceedings of the 1977 conference of the American Society for Information Science. In press.

036 Gellman, Aaron
Gellman Research Associates
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Jenkintown, PA 19046

Grant: GN-42272
Date: December 1975

THE ROLE AND APPLICATION OF SCIENTIFIC AND TECHNICAL INFORMATION IN THE PROCESS OF INNOVATION: INVENTION AND CONCEPTION. 607 pages.

Availability: NTIS, PB 256 580

The object of this research project was to explore the information gathering and use habits of a sample of scientists and engineers who, by job function and performance, have been found to be innovators. The sample for the survey was identified primarily through a yearly innovation-awards program which evaluates technologies submitted by a wide variety of firms producing diverse goods in divergent geographic areas. This program is sponsored and carried out by a trade publication with a wide circulation in the research community. The project staff identified several hundred innovations equally distributed in four generalized industrial sectors: aerospace, chemical, electrical and electronic, and mechanical processing. The individual responsible for the conception and/or invention of the innovation was identified and contacted for possible inclusion in the study.

The final sample consisted of 90 innovators from the 4 industries including: 17 in the aerospace industry, 29 in the chemical sector, 28 in the electrical and electronic industry, and 16 in the mechanical processing industry. The data was collected for the study using a structured interview format with a limited number of open-ended questions. The results were tabulated and summary material was presented to an independent group of researchers active in information utilization and technological change to aid in interpretation as well as to suggest alternative analysis techniques.

The principle conclusion of the study is that the formal channels of communication, particularly in the scientific and technical information (STI) subset, are not extensively employed by the innovators. There is, however, considerably more use of formal STI to obtain nutritional information, i.e., to maintain a sufficient level of awareness. The role of STI in the process of innovation for this sample is threefold. It provides the innovator with a broad array of material which has current awareness value. STI is also employed to facilitate the process of innovation by helping technology over specific stumbling blocks. In

addition, STI is utilized as a checking mechanism, sometimes to discover what has been done, but more often to delineate what not to do.

037 Hillman, Donald J.
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Grant: GN-40900
Date: April 30, 1975

A STUDY OF INFORMATION REGENERATION FOR KNOWLEDGE TRANSFER. 45 pages.

Availability: NTIS, PB 263 342

The research described was designed to establish the foundations of information regeneration as a preliminary step toward the creation of a knowledge transfer system. The work was based on the assumption that the most likely environment for facilitating and sustaining such transfer would be a network of information processors and algorithms of the kind now being processed, together with management policies that are still to be developed. A related assumption was that knowledge transfer systems will evolve from the present generation of interactive information retrieval systems.

The LEADERMART system was selected as a basis for the research effort. LEADERMART, which was developed at Lehigh University between 1969 and 1972, provided the basis for new text-processing software, on-line file structures, and natural language question-analyzing capabilities. In particular, since LEADERMART was engineered around end users rather than information specialists, there was far less to do in the way of software modification to meet real user needs than there would have been in the case of other systems whose command languages do not resemble natural English. This advantage was most apparent in the development of QUANSY, the Question-Analyzing System. The report outlines the file organization of the system and details the software package of QUANSY.

The work accomplished on QUANSY provides a basis for subsequent development. Most of the awkwardness encountered in answer-generation has been eliminated in later versions of QUANSY, which now forms one of the components of an experimental knowledge transfer system. The last section in the report discusses the theory of information regeneration. This includes definitions, statements of calculus, and the synthesis of all the ideas now being applied to the

information regeneration possibility.

038 Kent, Allen; Anthony Debrons; Glenora Russell
Office of Communication Programs
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Pittsburgh, PA 15213

Grant: GN-27537
Date: July 31, 1975

CAMPUS-BASED INFORMATION SYSTEM. FINAL REPORT. 174 pages.

Availability: Contact authors

The plan for a Campus-Based Information System (CBIS) was developed in 1970. The program envisioned a one-stop reference service which would provide entry to all or most of the data bases relevant to a user's interest. The intent was to integrate new, nontraditional resources with the services of the University Library system, thus providing the University community with a wider range of bibliographic reference material and services than had been previously possible.

The CBIS program plan called for design and development in five distinct, yet overlapping, phases. The Conceptual Phase would produce the outline of the project and identify problem areas. Each problem and a response would then be defined in terms of cost, performance, and time in a Definition Phase. The Developmental and Test Phase would implement services that would be tested and evaluated. The Operational Phase would see the system institutionalized within the University complex; services would be expanded to non-University users in the Extension Phase. The basic concept of CBIS involved a great deal of direct or indirect work with magnetic data bases. Providing integrated services involved the development of an in-house computer program for user access. While implementation was proceeding, the Central Analysis Unit of CBIS began an evaluation and development process in which the present state of research activity was reviewed, the administrative structure of CBIS was studied, and the initial objectives of CBIS were reexamined.

The integration of nontraditional materials in established areas has been most successful. The popularity of computerized information is proof of user satisfaction. Another successful facet of CBIS has been the development of PIRETS, a software routine. This system, which is user oriented and transferable, is easy to use yet has sophisticated capabilities. A copy of the PIRETS User Manual accompanies the report. The large group which has benefited

includes faculty, staff, and students who have utilized CBIS. From reviewing the literature, it appears that no other university has succeeded in familiarizing (either through services or on-hand experience) such a large percentage of its population with the capabilities of magnetic data bases.

Other publication:

038a Williams, James G.
THE USE OF SIMULATION IN DESIGNING A COMPUTER-BASED LIBRARY NETWORK. Journal of the American Society for Information Science. In press.

039 Maidens, William A., III; Donald W. King
Aspen Systems Corporation; Westat, Inc.
20010 Century Boulevard
Germantown, MD 20767

Contract: C-769
Date: March 1975

EDITORIAL PROCESSING CENTER COMPUTER MODEL DOCUMENTATION.

Availability: NTIS, PB 243 299

A computer model which can be used by publishers for predicting costs of producing journals through an editorial processing center (EPC) is described. A working knowledge of the IBM 360/370 operating system is a prerequisite for operation of the programs documented in this manual, which is intended primarily for persons maintaining or operating EPC model programs.

The publication deals with the system's hardware considerations, general operating environment, and procedures for the processing of the two programs. The actual programs for the models are in two Fortran IV programs, developed and run originally on a CDC 6600 and later modified to run on IBM 360/370 OS/VS computers. The first program, called CURMOD, represents a model which allows prospective users to supply their own cost and time information for the journal preparation work as currently performed. The second program, EPCMOD, represents economic projections for the desired or designed EPC. The parameters entered for this program should represent the system configuration and other variables that the user intends in the prospective EPC.

A model was developed and used for a National Science Foundation study on the use of computers and related technology for the publication of journals. In this model, the prospective EPC publisher indicates the variables relating to his particular journal, and unique cost projections are produced.

040 Miller, Richard H., et al.
Applied Communication Research
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Stanford, CA 94305

Contract: C-951
Date: March 30, 1975

THE DESIGN, PRODUCTION, DISTRIBUTION AND MAINTENANCE OF A PLANNING GUIDE TO BE ENTITLED "GUIDE TO INNOVATION IN THE DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION." 63 pages.

Availability: NTIS, PB 243 438

This report describes work conducted to produce a prototype management planning guide to innovation in the dissemination of scientific and technical information (STI).

The work plan for the developmental portion of this project was divided into three major phases: Data Acquisition, Data Processing, and Planning Guide Preparation and Production of Draft Copies. Four data-acquisition efforts were carried out concurrently to identify innovations in STI dissemination, to identify the sources of information and equipment relating to innovations, and to identify those persons and organizations which might be the most appropriate recipients of any final product. These efforts included a literature review, a search through informal channels and personal contacts, a search keying on institutions and individuals identified as potential sources of information or potential users of the planning guide, and the development of innovations by the project staff. In the Data Processing phase, the staff constructed a process model of STI communication activity, developed initial parameters by which candidate innovations were identified and described, and converted the data into machine-readable form. Finally, after review by consultants, the guide was compiled based on seven major roles of the STI communication process.

In the draft of the guide, each function present in the communication process is described to give the reader an idea of each participant's responsibilities in terms of input, process, and output, and the means by which these

functions have traditionally been carried out. Following this description, innovative procedures and techniques are described in the context of each function. Alternative uses of the same innovation, alternative innovations, and larger configurations of equipment are discussed in terms of cost-effectiveness and the implications as to the manner in which the function would be carried out. In addition to the guide, a computer file was created as a glossary of terms used in printing and computer technology. Each term is accompanied by a short definition and a note of the discipline which uses the term.

041 Rawdin, Eugene
SYS-C-A-D, Inc.
1421 Longshore Avenue
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Grant: GN-42275
Date: December 1975

BEHAVIORAL FIELD STUDY OF 703 USERS IN ACADEMIC AND INDUSTRIAL SCIENTIFIC AND TECHNICAL LIBRARIES. FINAL TECHNICAL REPORT, 504 pages. FINAL SUMMARY REPORT, 90 pages.

Availability: NTIS, PB 256 479 (final technical report);
SYS-C-A-D (final summary report)

A field survey was conducted in 23 scientific and technical libraries to test the hypothesis that principles and procedures used in marketing and consumer behavioral sciences can be successfully applied to interactions between such libraries and their patrons in a manner which produces useful insights for information vendors, library staff, and users. A consumer behavior model of library users was first constructed, and the model elements and linkages were validated by field data. Thirteen of the libraries were in industrial enterprises, seven were in academia, and three were area resource libraries. The study included 703 subjects; 382 worked in industry and 321 were from academia.

The survey instruments included unobtrusive observation plus brief interviews in the participating libraries. The data obtained from the informants were compiled separately for industry and academia. Forty one-way tables plus 204 two-way and three-way tables were derived. The results were selectively analyzed and interpreted.

Study results indicate that consumer behavioral modeling and marketing science concepts such as marketing segmentation are applicable to the assessment of information needs of scientists and technologists, and that user characteristics, intended information use, needs, behavior,

and library visit success are related. Study recommendations enumerate techniques which can produce revenue for libraries and improve user satisfaction. These include library space/facility rental to long term users; direct sales marketing techniques; promotion of abstracting and indexing services; rapid document delivery; integration of technical reports into the collection; exploitation of consumer product display techniques; execution of user needs studies based on this study and subsequent exploitation of study results; and management support for libraries/information centers. All study recommendations are supported by data and observations obtained.

Other publication:

041a Rawdin, Eugene
FIELD SURVEY OF INFORMATION NEEDS OF INDUSTRY SCI/TECH LIBRARY USERS. Proceedings of the 38th Annual Conference, Vol. 12. American Society for Information Science, Boston, October 26-30, 1975, pages 41-42.

This paper briefly outlines the study described above. Consumer behavioral theory and related information science literature were the sources from which variables were selected for a field study of industry scientific and technical library users. One of the purposes of the study was to investigate and relate information need/use parameters to other parameters in order to describe and explain the behavior of industry library users.

042 Reader, William A.; Jon E. Updike
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National Archives and Records Service
General Services Administration
Washington, DC 20408

Grant: CA-134
Date: June 1975

FINAL REPORT ON A STUDY OF DATA MANAGEMENT POLICIES IN FEDERAL SCIENTIFIC DATA CENTERS. 119 pages.

Availability: NTIS, PB 243 668

This study was begun to determine the policies, procedures, and practices of Federal agencies which create and market machine-readable data to the public and to the

scientific community. This project was limited to five intensive case studies of existing Federal scientific data centers: the National Oceanographic Data Center of the National Oceanic and Atmospheric Administration; the Earth Resources Observation System Data Center of the U.S. Geological Survey; the National Air Data Branch of the Environmental Protection Agency; the National Space Science Data Center of the Goddard Space Flight Center; and the National Standard Reference Data System of the National Bureau of Standards.

The survey was based on a number of assumptions, the first being that these data centers functioned on the basis of legislation and firmly established policies. Second, it was assumed that government data centers functioned in the entire process of data collection, manipulation, transformation, archiving, and dissemination. Third, the authors thought that all data centers functioned as relatively autonomous units with all cost expenditures coming from the data center's budgeted funds. Visits and interviews were conducted at each of the five centers. Data gathered about each center included enabling legislation; the center's mission, organization, staffing patterns; data collection policies; and the data services provided.

Many commonly held beliefs about Federal data operations were not valid at all. The data centers were much less clearly structured and uniform than had been anticipated. Several neither collected nor disseminated data. Several were so lacking in autonomy that they did not control their own finances or did not even know what all their costs were. Each data center exhibited one or more characteristics which differentiated it from the others, and some of these traits revealed fairly well the nature of Federal data center operations. Because of the differences, it was decided to prepare detailed center studies rather than comparisons. The case studies presented often differ in focus and in the information conveyed since the concepts and areas important for understanding each particular data center's organization and activities have been stressed.

043 Schipma, Peter B., et al.
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Grant: GN-40772
Date: April 30, 1975

STUDY OF INDEXING AND INFORMATION DISPLAY.

Availability: Contact IIT Research Institute

Three major experiments were involved in this study of indexing and information display at the IIT Research Institute (IITRI). Experiment One studied the effect of citation completeness of retrieval effectiveness. Experiment Two investigated the effect of citation completeness on human judgment of relevance. The final experiment studied the effect of indexing on retrieval effectiveness.

To reduce the variables, all data-base versions used represented Chemical Abstracts Service (CAS) data-in common IITRI format. Machine searches were conducted on the various versions with the same software. In addition, a survey of related literature was conducted and voluminous data-base statistics generated. For the first experiment, quantitative data were obtained for the retrieval effectiveness of searches conducted on data bases containing citations with varying degrees of completeness. Qualitative evaluations of relevance were also conducted, and the results treated statistically. These relevance evaluations were used to obtain an idea of the effect of completeness on judgment of relevance. The same searches and data-base versions were used for the third study of indexing influence on retrieval effectiveness.

The experiments indicated that the addition of keywords to citations is of high retrieval value at low added retrieval cost. Although of high retrieval value, addition of abstracts incurs higher costs. Citations alone are definitely insufficient, and abstracts should be present if at all possible. The disparity between data inherent in citations with abstracts and data generated via indexing shows up strikingly in the experiments. By single-term searches, by full searches and by term-frequency analysis, for the set of data bases used with subject-oriented questions, neither type of data alone was sufficient.

Other publications:

043a Kaminecki, Ron
A COMPARISON OF SELECTIVE DISSEMINATION OF INFORMATION SYSTEMS. On-Line Review Vol. 1, No. 3, 1977, pages 195-206.

A batch system of presenting selective dissemination of information (SDI) is compared to four types of commonly available on-line SDI Systems. The operating parameters of each are outlined, and estimates of bottom-line costs for each are given. The author concludes that no one methodology

can completely fulfill the needs of a specific user. He recommends a combination of batch and on-line systems to most efficiently satisfy user needs.

043b Kaminecki, Ronald M; Patricia A. Llewellen
SEARCHING CHEMICAL ABSTRACTS CONDENSATES, ON-LINE AND BATCH. Journal of Chemical Information and Computer Science, Vol. 16, No. 3, August 1976.

This paper is a comparison of batch and on-line methods of information retrieval. The authors used ongoing selective dissemination of information (SDI) services as the basis of the comparison. Neither method is rated above the other but suggestions for the effective use of both SDI are presented.

043c Schipma, Peter B.
COMPUTER SEARCH CENTER STATISTICS ON USERS AND DATA BASES. Journal of Chemical Documentation, Vol. 14, No. 1, February 1974, pages 25-29.

Statistics gathered over 5 years of operation by the ITT Computer Search Center are summarized. Profile terms and lists, use of truncation modes, use of logic operators, and some characteristics of CA Condensates are discussed.

044 Senders, J. W.; C. M. B. Anderson; C. D. Hecht
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Grant: SIS 74-12627
Date: June 1975

SCIENTIFIC PUBLICATION SYSTEMS: AN ANALYSIS OF PAST, PRESENT AND FUTURE METHODS OF SCIENTIFIC COMMUNICATION. 199 pages.

Availability: NTIS, PB 242 259

There is a widespread feeling that the current methods of scientific publication are becoming inadequate to meet the needs of scientific communication. The sharply rising cost of producing scholarly journals is forcing scientific societies and libraries to reduce the services they offer to the reader, while at the same time there is paradoxically an exponential increase in the volume of the literature, leading to a form of information pollution. It is evident that some changes must be made to the publication system in

order to reduce the impact of the problems of cost and quantity.

Some of the trends in scientific journal publication are analyzed. Projections from these trends indicate that the costs of producing journals will continue to increase rapidly, and that the volume of the literature will continue to double about evey 12 years.

A brief survey of attempts to alleviate problems of rising costs indicates that none of them will be fully successful. However, an examination of developments in computer and telecommunications technology suggests that the concept of an electronic journal might be feasible. A paper would be considered published in the electronic journal when it is available for retrieval in an open data base. Subscribers would interact with this system by means of a remote terminal which is connected to the computer over a telecommunications link. The last part of the report examines the electronic journal in some detail and concludes that the concept is technologically feasible. An analysis of the costs of electronic publication indicates that, while production costs are currently higher than those of paper publication, the costs of the two methods will cross in about 3 years time, in 1978. When considering hidden costs, the analysis indicates a crossover point in 1994. Combining both hidden and production costs, it is estimated that electronic publication will cost as much as paper publication in 1996, and will cost less thereafter.

045 Strawhorn, John M.; Richard L. Omerso; William A. Creager
Capital Systems Group, Inc.
6110 Executive Boulevard, Suite 850
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Contract: C-950, DSI 74-24410
Date: April 15, 1975

IMPROVING THE DISSEMINATION OF SCIENTIFIC INFORMATION: A PRACTITIONER'S GUIDE TO INNOVATION. 203 pages.

Availability: Free through Capital Systems Group, Inc;
NTIS, PB 247 057

This publication is an "idea book," designed to alert editors, publishers, and others responsible for the primary dissemination of scientific and technical information (STI) to ideas, procedures, systems, and technologies that they could use to disseminate information more effectively and economically. It describes innovations and improvements in several areas as illustrated by the guide's section headlines: "Innovations in Conventional Journal and

Monographic Publishing," "Print-on-Paper Alternatives to Conventional Publication," "Non-Print-on-Paper and Mixed-Media Innovations," "Trends and Prospects," and "Innovations Needed". The first issue contains 923 brief articles, each describing some particular innovative concept or system. It also includes a glossary and suggestions for further reading.

The Guide will be updated periodically and updated versions will be deposited with NTIS each year.

Other publications:

045a Creager, William A.; Richard L. Omerso; John M. Strawhorn DEVELOPING A PLANNING GUIDE FOR INNOVATION IN THE DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION: FINAL REPORT OF PHASE I. March 31, 1975. 73 pages.

Availability: NTIS, PB 243 469

This report summarizes work up to this time on a project designed to identify and describe innovations that might be applied to primary dissemination of scientific and technical literature and to organize the project's findings into a guidebook that might be used by editors, publishers, and others responsible for communication programs. In addition to this report, the project culminated in a prototype of the guidebook and a proposed plan for large-scale production and distribution of the guide. The results of the project are represented by several physical products: the innovation information and data files, a list of individuals requesting copies of the guide, a list of organizations and publications which should receive announcements about the guide, and miscellaneous working files and data.

045b Creager, William A.; John M. Strawhorn; Richard L. Omerso PLANS AND RECOMMENDATIONS FOR ESTABLISHING AND OPERATING A CLEARINGHOUSE FOR INNOVATION IN SCIENTIFIC COMMUNICATION. March 31, 1975. 32 pages.

Availability: NTIS, PB 243 461

This proposal presents recommendations resulting from a project to identify and describe the innovations applicable to the primary dissemination of scientific and technical information. The fundamental recommendation is for the

establishment of a Clearinghouse for Innovation in Scientific Communication. It is recommended that the Clearinghouse's first activity be the publication of a guidebook that would describe innovations applicable to primary dissemination. Tentative plans are also presented for the gradual enlargement of the Clearinghouse's scope to include, within the first year of operation, the secondary and tertiary dissemination of information.

046 Tressel, George W.; Patricia L. Brown
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505 King Avenue
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Grant: SIS 74-10449
Date: March 1975

A CRITICAL REVIEW OF RESEARCH RELATED TO THE ECONOMICS OF THE SCIENTIFIC AND TECHNICAL INFORMATION INDUSTRY. 64 pages.

Availability: NTIS, PB 245 665

The authors reviewed, assessed, and synthesized recent literature and participant's experience and opinion in the scientific and technical information field. In weighing questions of information value and resource allocation, the authors concluded that economic analysis techniques should be able to contribute insight and more rational grounds for decisions.

The authors reviewed salient material from several hundred articles from the United States and Great Britain. While many of their conclusions and recommendations are based on examination of the literature, the team also talked with representatives of large government STI services and nongovernment, nonprofit services; members of trade associations in the information field; and a variety of professional information scientists, librarians, and economists. In November 1974, they cosponsored with the American Society for Information Science a Panel on Policies and Directions in the Research on Scientific and Technical Information Marketing Economics. The discussion reflected the information gained from the literature search.

The size and intricacy of the scientific and technical information system is substantial, and its fragmented growth is reflected in innumerable questions about its goals, value, and role in scientific process, not to mention the measures of cost and utilization.

The authors recommend a broad effort to collect available data, together with development of standardized

collection methodologies which can meet critical scrutiny as well as provide the necessary additional comparative and additive information about STI field. The report further stresses a strong need for increased research and policy study of the roles and processes of information diffusion into the private sector.

047 Turoff, Murray
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Grant: SIS 75-06783
Date: August 10, 1975

INITIAL SPECIFICATIONS ELECTRONIC INFORMATION EXCHANGE (EIE) SYSTEM RESEARCH REPORT #1. 85 pages.

Availability: Contact author

This document is intended as a specifications manual to guide the development of the Electronic Information Exchange (EIE) System. The system aims to provide its users with the ability to handle communication of textual information. The design approach represents an attempt to merge computer and communications technology with the human requirements and communication structure associated with the manipulation of textual information by a group of individuals. The system provides such functions as the composing, editing, searching, and organizing of various kinds of text information.

The document does not represent a User's Manual, but it does contain the specifications for using the system. The first part of the report defines the component, role, and action concepts used in the system. The second part explains in detail the capacities of the system in terms of communication. For example, the system allows a group of users to vote on a concept on which they may be working, and then the system will count the votes and record the results. Commands are reviewed, and keyboard shortcuts are presented. The last part of the guide outlines procedures for sending messages, submitting reports and news, modifying records in the file, and text editing.

As an initial specification, the report is subject to modification. At this stage the authors have not included a number of features that have been considered, but the second year of development will determine whether they will be employed. Decisions as to which of these should be used may have to wait until some actual use is made of the system.

The report discusses individual system components which allow the users to obtain answers to specific questions on system use and options.

Other publications:

047a Featheringham, Tom
COMPUTERIZED CONFERENCING AND HUMAN COMMUNICATION. IEEE Transactions on Professional Communication, Vol. PC-20, No. 4, December 1977, pages 207-213.

Hardware, functional characteristics, and user protocols of the Electronic Information Exchange System (EIES) (a computerized conferencing system) are described. Those characteristics are then reviewed from the standpoint of human communications. The EIES was primarily designed as a test facility to support information exchange among small groups of research scientists and engineers.

047b Featheringham, Tom
TELECONFERENCES: THE MESSAGE IS IN THE MEETING. Data Communications, July 1977, pages 37-41.

A review of computer conferencing, including its history, formats, utility, and costs is presented. The author feels that the exchange of ideas between individuals over a communications network has the potential for improving and radically altering the flow of business information.

047c Hiltz, Starr Roxanne
COMPUTER CONFERENCING: ASSESSING THE SOCIAL IMPACT OF A NEW COMMUNICATIONS MEDIUM. Technological Forecasting and Social Change, Vol. 10, No. 3, 1977, pages 225-238.

A review of the literature on small group communications experiments serves as the basis for deriving a set of hypotheses about the effects of computer conferencing upon interaction processes within problem-solving groups. The uniqueness of this form of communication and the convenience offered suggest that it will ultimately have significant impacts at the societal level. Planned strategies for testing these hypotheses through field trials, surveys, and laboratory experiments are described.

047d Hiltz, Starr Roxanne
THE HUMAN ELEMENT IN COMPUTERIZED CONFERENCING SYSTEMS. Presented at the American Society for Information Science meeting, Chicago, September 1977.

Three facets of ongoing field trials providing scientific research communities with the use of a computerized conferencing system are described.

The designed capabilities of the hardware and software that comprise EIES (Electronic Information Exchange System) are discussed.

The research design for assessing the impact of this system upon its users is presented.

Some initial findings about the human roles in the system and human reactions to this form of communication are included.

The author concludes that with some sufficiently well led, large and well motivated, geographically dispersed groups, EIES appears to be able to support high levels of social and intellectual interaction.

047e Hiltz, Starr Roxanne
THE IMPACT OF A COMPUTERIZED CONFERENCING SYSTEM UPON SCIENTIFIC RESEARCH SPECIALTIES. Journal of Research Communication Studies, in press.

This paper describes a computer conferencing project, Electronic Information Exchange System (EIES), and issues which are being explored relative to evaluation of its impact on scientific communications and productivity. Among these issues are the impact upon (1) the development and resolution of scientific controversies; (2) the overall stage of paradigmatic development; (3) the social structure of the specialty; and (4) the facilitation of inter disciplinary communication and research.

Evaluations were made within social and natural science user groups. The data were also compared across user groups. Subjective evaluations by users and questionnaires served as sources of data.

The author concludes that the field experiment with the EIES system represents an attempt to do three things at once: (1) field test and improve a new computer communications technology; (2) aid scientific progress by providing improved communications within scientific research specialties, and (3) provide greater insight into the nature

of these scientific specialty groups themselves.

047f Turoff, Murray
THE COST AND REVENUES OF COMPUTERIZED CONFERENCING. Proceedings of the Third International Conference on Computers and Communications, August 1976.

Costs, revenues, and charging policies of Computerized Conferencing for the purposes of planning and evaluation are examined. Values used reflect the development and operation of a computerized conferencing system, based on a dedicated mini-computer. The analysis represents a particular hardware configuration and a specific implementation approach. Current experience of the effort at the Computerized Conferencing and Communications Center at NJIT (New Jersey Institute of Technology) utilizing the INTERDATA 7/32 minicomputer coupled to a DIVA DD-32 disk system is reflected. The author demonstrates that computerized conferencing can be cheaper than correspondence by mail.

047g Turoff, Murray
"MEMEX" REVISITED. Technological Forecasting and Social Change, 1977, AN ON-LINE INTELLECTUAL COMMUNITY OR "MEMEX" REVISITED. Journal of Technological Forecasting and Social Change, Vol. 10, No. 4, 1977, pages 401-412.

Long-term implications for scientific communications resulting from EIES (Electronic Information Exchange System) type systems are evaluated.

The paper attempts to compile the manner in which current efforts in abstract services, journal and book publication, word processing, computerized conferences, and information retrieval systems may ultimately evolve as a single system serving the needs of the scientific and technical community.

047h Turoff, Murray; Starr Roxanne Hiltz
COMPUTERIZED CONFERENCING: A REVIEW AND STATEMENT OF ISSUES. . Presented at the NATO Symposium on the Evaluation of Telecommunications Systems, Bergamo, Italy, September 1977, Plenum Press.

A review of computerized conferencing which is designed to facilitate and structure complex human communication processes is presented. Key policy, research, and evaluation

issues raised by this form of telecommunication are discussed. Near-future characteristics, potential applications, and impact-assessment problems of the systems are reviewed.

The authors feel that the most important impacts will result from new types of applications rather than from mere substitution for existing communications.

They also feel that there is an almost unlimited range of capabilities and applications for computer-structured human communication systems and that currently incorrect images of these systems may be inadvertently produced for policy and decision makers.

047i Turoff, Murray; Starr Roxanne Hiltz
MEETING THROUGH YOUR COMPUTER. IEEE SPECTRUM, May 1977, pages 58-64.

This article describes, in a narrative nontechnical manner, computer conferencing and its advantages. Costs are reviewed, and the authors present evidence from group processes research relevant to a computer conferencing mode. The authors believe that the drawbacks will be compensated for by the advantages which stem from anonymity and also through the intriguing ways in which users learn to carry on the same informal social interaction as in a face-to-face meeting.

047j Turoff, Murray; James Whitescarver; Starr Roxanne Hiltz
THE HUMAN-MACHINE INTERFACE DESIGN IN A COMPUTERIZED CONFERENCING ENVIRONMENT. Proceedings of IEEE, Man Systems and Cybernetics Conference, Washington, September 1977, pages 145-157.

The philosophy of the user interface design for EIES (Electronic Information Exchange System) is reviewed.

EIES, as a computerized conferencing system, represents an integrated mix of a specific communications structure and various data processing capabilities formulated to facilitate or aid the communication process of a particular human endeavor.

The specific objective of EIES is to facilitate the communication and exchange of information among various small scientific or technical groups prior to formal publication.

An examination is made of the design philosophy and

requirements of the human interface and some of the problems and experiences to date are reviewed.

048 Bearman, Toni Carbo
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Grant: DSI 76-15530
Date: November 19, 1976

CONFERENCE REPORT TO THE NATIONAL SCIENCE FOUNDATION ON THE NFAIS/ASIDIC MEETING ON BIBLIOGRAPHIC DATA BASES, July 14-16, 1976. 4 pages.

Availability: NFAIS; NTIS, PB 261 522

A meeting of representatives from the Association of Information and Dissemination Centers (ASIDIC) and the National Federation of Abstracting and Indexing Services (NFAIS) and observers from several other organizations was held on July 14-16, 1976 in the offices of the National Science Foundation, Division of Science Information, Washington, D.C.

The meeting was intended primarily as a planning session preparatory to the proposed four-way reciprocity meeting with representatives of the European Association of Scientific Information Dissemination Centers (EUSIDIC) and the International Council of Scientific Unions Abstracting Board (ICSU/AB). The specific objectives of the planning meeting were to review and evaluate responses to the recommendations of the May 1975 meeting among ASIDIC, EUSIDIC, ICSU/AB, and NFAIS; to identify issues and topics of concern to ASIDIC and NFAIS for inclusion on the agenda of the planned four-way meeting; and to identify topics requiring preparation of position and/or working papers prior to subsequent two-way and four-way meetings. Initial discussions at the meeting focused on the list of minimum required data elements proposed at the four-way meeting. Of particular interest was the NFAIS survey of its member organizations concerning current practices relative to these data elements. The results of this survey are to be compiled as a working paper for distribution and further detailed consideration prior to a four-way meeting. A draft working paper, Literature Publication Code Types prepared by J. L. Wood, was distributed at the meeting and discussed briefly. This paper will also be used as a working document for consideration at the next two-way and four-way meetings.

Consideration of agenda items for the proposed reciprocity meeting led to group consensus that ASIDIC and NFAIS interests were considerably broader in scope than

those upon which the first four-way meeting had focused attention. Thus, the group decided that, in addition to the primary focus on the list of data elements, NFAIS and ASIDIC might wish to pursue broader areas of interest common to the two groups as a separate project.

049 Becker, Joseph
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Contract: C-963
Date: July 4, 1976

A NATIONAL APPROACH TO SCIENTIFIC AND TECHNICAL INFORMATION IN THE UNITED STATES. 62 pages.

Availability: NTIS, PB 261 270

This is a state-of-the-art report concerning government interest in science information and its coordinated dissemination. A historical discussion outlines the communication of scientific research results and the government's actions concerning dissemination, particularly the role of NSF. The emphasis then turns to current issues in national policy planning. The author states that organization of scientific communication is essential to effective dissemination, and the Federal government has the responsibility for coordination because of its position as primary research funder.

The author concludes that science information requires changes in policy and organization to meet the problems of the coming decades. He feels that unless the people of post industrial America begin to manage scientific and technical knowledge more systematically and creatively, the ability to apply scientific knowledge to national problems will deteriorate. Moreover, continued fragmented development may lead to costly, overlapping, and unrelated science information systems which can never be made mutually reinforcing. The proposals outlined represent practical steps which the Federal government can take now, within existing authorities, to support a viable and realistic national program in the field of science information.

050 Benson and Benson, Inc.
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P.O. Box 269
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Grant: DSI 76-16654
Date: December 1976

STUDY OF NATIONWIDE ON-LINE ACCESS TO EVALUATED ENGINEERING DESIGN DATA SURVEY I--FOCUS GROUP STUDY.

Availability: NTIS, PB 264 981

A study is being conducted to determine which new information products and services, including on-line interactive access based on the Center for Information and Numerical Data Analysis and Synthesis, would be accepted on a sustainable basis by the engineering community. New product creation and development methodologies proven successful in the commercial marketplace are being studied.

This report presents the results of three focus group discussions with engineers. The groups were composed of "bench" engineers from various commercial, government, and academic institutions located in Philadelphia, Los Angeles, and Chicago. The discussion sessions centered on how information is obtained in the engineer's work, the problems they have in obtaining information, their awareness of data centers as information sources, their likelihood of using on-line data retrieval, and their projected reasons for use or nonuse. The technique used to gather the data consisted of focused interviewing with a moderator introducing a topic of discussion to a panel of survey conferees. While guiding the discussion through certain predetermined aspects of the topic, the moderator encouraged the conferees to react to one another's remarks and to state their own concerns, opinions, and experiences.

The authors conclude that, because engineers are more oriented to applications than to the generation of new ideas, they are willing to accept data from secondary sources without systematically reviewing the state of the art. They state that the engineers' information orientation is often pragmatic. Realizing the shortcomings of their present information acquisition methods, engineers are currently evaluating data sources. Any successful new system would have to be more accurate, have more detail, and be less expensive and more up to date than present systems.

Other publication:

050a Benson & Benson, Inc.
SURVEY OF NATIONWIDE ON-LINE ACCESS TO EVALUATED ENGINEERING DESIGN DATA STUDY II--SURVEYS OF CHIEF ENGINEERS AND DESIGN ENGINEERS. June 1977. 39 pages.

In the second study, questionnaires were designed to develop quantitative measurements of engineers' current sources of numerical data, satisfaction with sources, need for numerical data, quality of data needed, current problems in data acquisition, and availability of terminal access hardware. Several conclusions appear from this survey. A high proportion of the time presently spent by engineers in securing data appears to be devoted to the acquisition of cost and supply information from vendors. When presented with a list of numerical data problems, the majority of engineers agreed that: (1) abstracts would be used if an easy-to-use index were provided; (2) standard handbooks are not updated quickly enough; and (3) information sources require one to know in advance what material is being sought.

051 Center for Applied Linguistics
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Grant: GN-41370
Date: September 1, 1976

AMERICAN JOURNAL OF COMPUTATIONAL LINGUISTICS.

Availability: Contact the Center for Applied Linguistics

This project consists of publishing Volumes 2 and 3 of the American Journal of Computational Linguistics spanning 1974-76. Principal investigator and managing editor of the new journal is A. Hood Roberts; the Center for Applied Linguistics administers the grant.

The aim of the publication is to report current research and to announce meetings, conferences, courses, publications, and other activities of interest and importance to computational linguists. The American Journal of Computational Linguistics (AJCL) is the official journal of the Association for Computational Linguistics, which published Mechanical Translation until 1968 and The Finite String until 1973.

052 Clayton, Audrey; Norman Nisenoff
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Grant: GN-42294
Date: May 1, 1976

A FORECAST OF TECHNOLOGY FOR THE SCIENTIFIC AND TECHNICAL INFORMATION COMMUNITIES--THE INFLUENCE OF TECHNOLOGY UPON SCIENTIFIC AND TECHNICAL COMMUNICATION. 4 vol. 958 pages.

Availability: NTIS, PB 253 937

The study concerns an exploration into the future of scientific and technical (S & T) communication. Its primary achievement was the development of a unified body of data representing "best judgement" forecasts of communications systems performance, costs, and availability for the next 25 years, in conjunction with a parallel assessment of the usage patterns and needs of representative user groups in the S & T community. The data will allow the identification of lagging areas of development which constrain total systems capability.

In order to derive the required forecasts, a major survey of various representative S & T communities was performed, resulting in a unique and extensive data base with an exploratory forecast of relevant technologies, identification of potential events which could significantly affect applicable technological developments, and suggestions for appropriate government action to stimulate activity in lagging areas. Prototypical systems were postulated for 1980, 1985, and 1990, and compatible gross system specifications were provided. In order to identify user needs which represent limiting factors in total systems capability, growth rates for key system characteristics were reviewed as to their relevance. This methodology provides an invaluable tool for policy makers to detect technological areas in need of external support and stimulation.

In summary, this study has reviewed the potential capabilities of communications systems from the users' point of view, starting with user requirements. It has determined those areas of technological development that constrain the satisfaction of user needs for timely and accurate scientific and technical information. Finally, it has examined the consequences of potential government intervention designed to remove such limitations. The study lays the necessary foundation upon which governmental policy makers can establish an optimum program of guidance and support.

053 Comer, James M.; Alok K. Chakrabarti
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Grant: SIS 75-13195

Date: October 1976

CHANNEL OF DISTRIBUTION STRATEGY IN THE MARKETING OF TWO INFORMATION SYSTEMS: A COMPARATIVE STUDY. 172 pages.

Availability: NTIS, PB 261 523

The major research objective was to ascertain if traditional marketing-channel theory developed for physical products also applied to the marketing of information or information services. In addition, several quite specific objectives were set for the project. The authors wanted to identify the distribution policies established by two types of information systems, namely a fact-oriented system, Instant Data Access Control (IDAC), and a bibliographic system, DIALOG. Also, the project sought to explore the process by which the distribution channel form was originally conceived and to examine the criteria used by the National Design Center (IDAC) and Lockheed (DIALOG) in establishing channel intermediaries for system redistribution.

The research study was conducted in three phases. The first phase entailed an exploration and analysis of the marketing of scientific and technical information (STI) literature. In the next phase, personal interviews were conducted with some distribution channel members of the STI industry. Finally, the channel theory of marketing was compared with the channel realities revealed in the interviews; conclusions and hypotheses were drawn. Preliminary interviews with National Design Center and Lockheed made it obvious that an understanding of the industry channels could only be obtained by interviewing other available channel members. Therefore, ten channel members were interviewed and the results were incorporated into the hypothesis formulation.

Most researchers concerned with channel theory and analysis appear to assume implicitly that product-based channels are dominant and adequately represent service products. The results of the study indicate that channel-of-distribution theory must be reviewed for its general applicability. Intermediaries in the distribution of services appear to differ from their counterparts in physical product-based channels along several important dimensions, such as profit orientation. This research on industrial service products indicated they may have distribution channels differing from consumer service products. The results support the observation that the distribution of services can occur at a time different from the production of services.

Other publications:

053a Comer, James M.
ALLOCATE: A COMPUTER MODEL FOR SALES TERRITORY PLANNING. Decision Sciences, Vol. 5, No. 3, July 1974, pages 323-338.

The nature of a call planning system named ALLOCATE, designed to be employed by upper sales management for sales territory planning, was explored. ALLOCATE can be used either as an input device for sales management decisions, such as sales-territory-size, or as a vehicle for determining the effects of alternative call allocation strategies on territorial revenue over multiple time periods.

053b Comer, James M.
THE COMPUTER, PERSONAL SELLING AND SALES MANAGEMENT. Journal of Marketing, Vol. 39, No. 3, July 1975, pages 27-33.

This article reviews published accounts of the integration of the computer into reporting, analysis, and decision making in personal selling and sales management. It was shown that, contrary to tradition, the computer has applications in this area of marketing, but so far only a few problems have been attacked beyond the routine computer-based sales reporting and analysis systems.

053c Comer, James M.
MARKEX: A COMPUTER BASED MARKETING EXERCISE SERIES. AACSB Bulletin, Vol. 12, No. 2, January 1976, pages 60-63.

This article describes the nature and application of MARKEX, a sequence of computer-based, on-line exercises in marketing management decision making for classroom use. The sequenced exercise, basically a hybrid between a case approach and a computerized game, attempts to maintain the best features of both cases and games while eliminating some of their shortcomings. In addition, the interactive nature of the exercises permits some elements of programmed learning. The authors found MARKEX to be useful to the class. The variety introduced through the computer is good, and students were vocal in their satisfaction. Only when the user, be it sales representative or sales manager, accepts the system as relevant to his needs and integrates it into his routine can it be truly labeled a success.

054 Committee on International Scientific and
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Grant: DSI 74-12167
Date: November 1976

PUBLICATIONS OF THE INTERNATIONAL UNION OF GEOLOGICAL SCIENCES: THEIR INFLUENCE ON U.S. GEOSCIENTISTS. Proceedings of the Annual Meeting of the Geoscience Information Society, Salt Lake City, Utah, November 1976. 16 pages.

Availability: Contact CISTIP

Patterns of citations to International Union of Geological Sciences (IUGS) publications in subsequent geoscience research were investigated. Using the Science Citation Index, 3-8 years of citation data were gathered for 1075 conference and symposium papers, data compilations, reviews, and bibliographies taken from 26 selected IUGS publications.

Citation rates for individual papers for a 5-year period varied from 0 to 31 citations/paper/year, with an average of 0.48 citations/paper/year. Rates more than doubled for symposia and conference volumes, thus confirming the IUGS policy of encouraging publication in the journal literature. Citation data for time periods greater than 5 yers showed that publications in the geological sciences have a longer half-life than those of other disciplines. Citations appeared in 1-89 different journals per conference, a measure of breadth of influence and interdisciplinary appeal. It was concluded that, in spite of low citation rates in some instances, publications sponsored by the IUGS are of considerable importance to the U.S. geoscience community.

The Board on International Organizations and Programs, National Academy of Sciences requested the assistance of the Committee on International Scientific and Technical Information Programs (CISTIP) in assessing the value of scientific union-gathered publications to American scientists in terms of their awareness and impact. CISTIP agreed to select one union as a test of a methodology and, depending on the results, to extend the study to other unions. The International Union of Geological Sciences

(IUGS) was selected for the test because a Geoscience Information Society exists in the United States.

055-1 Joint Consultative Committee of CSIR; National Academy of Sciences; International Development Research Centre (Ottawa); Council for Scientific and Industrial Research, Acera, Ghana

Grant: DSI-74-12167

THE SCIENTIFIC AND TECHNICAL INFORMATION (STI) IN GHANA: ROLE OF THE CSIR IN DEVELOPING A NATIONAL STI NETWORK. August 1976. 82 pages plus attachments.

Availability: Contact CISTIP or NAS

In 1972 an Ad Hoc Advisory Committee on Scientific and Technical Information identified a number of problem areas in the provision of scientific information services in Ghana. Among the proposals, the committee recommended that the Council for Scientific and Industrial Research (CSIR), the Ghanian national scientific and industrial research institution, be the agency responsible for implementing decisions on the coordination of scientific and technical information (STI) activities, and the CSIR accepted this focal-point role. The body of this report outlines the activities of a Joint Consultative Committee consisting of CSIR, the National Academy of Sciences, and the International Development Research Center which met July 4-23, 1976. The Committee studied and evaluated the scientific information resources and needs of Ghana.

The meeting was arranged to perform the following activities: (1) to examine how far the new information wing of CSIR could be organized for effective information services; (2) to examine the present situation and future needs in regard to scientific information; (3) to discuss possible assistance to CSIR in its coordination efforts; and (4) to submit recommendations and a working document for further action.

The Committee's recommendations are based on the assumption that the sharing of STI resources on a national scale can only be sustained by a spirit of cooperation among the librarians and library authorities of the libraries in Ghana. The recommendations encompass every aspect of the organization of information services including collection development, document delivery service, computer facilities, staffing, and library cooperation. The Committee, in making these suggestions, has not set any priorities, timing, or phasing for their implementation. The Committee recognizes the complexities of the CSIR organization and feels that the

Executive Chairman of CSIR is the best person to decide which of the recommendations are feasible and in what order they should be approached.

055-2 Werdel, Judith, A.; Scott Adams
U.S. PARTICIPATION IN WORLD INFORMATION ACTIVITIES. Bulletin of the American Society for Information Science, Vol. 2, No. 8, March 1976, pages 44-51.

A historical review of American scientific, technological, and economical progress and international communication is presented. Although condensed, the review covers four epochs in the history of America: the Age of Dependence, the Age of National Growth, the Growth of Specialization and International Cooperation, and the Modern Era. Furthermore, it highlights U.S. participation in the traditions and developments of international scientific and technical communication.

056 Creager, William A.
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Contract: C-1001
Date: July 1976

PAGE-CHARGE POLICIES AND PRACTICES IN SCIENTIFIC AND TECHNICAL PUBLISHING: A HISTORICAL SUMMARY AND ANNOTATED BIBLIOGRAPHY. 59 pages.

Availability: NTIS, PB 256 409

The purpose of this study is to conduct a thorough review of Federal policy options through an examination of current page-charge practices in the publishing field.

The introductory section is a historical summary of page-charge practices beginning with the financial difficulties of the American Physical Society in the 1920s to the acceptance of mandatory page-charge policies by the Federal Council for Science and Technology in 1974. The summary is based on the annotated bibliography which is presented in the second section. This bibliography includes 1671 citations from the "open" literature as well as from government publications. The bibliography is arranged in chronological order to enable the reader to trace the development of opinion and official policy concerning page charges over the last 40 years. Each bibliographic citation is numbered sequentially as it appears in its proper

chronological position. Cross-references connect related items by a "SEE" or "SEE ALSO" notation which appears with the assigned citation number. An author index cross-referencing from authors to citation numbers is also included.

Other publication:

056a Klein, Mary E.
FEDERAL SUPPORT OF SCIENTIFIC AND TECHNICAL PUBLICATION: A SUMMARY OF POLICIES AND PRACTICES. September 10, 1976. 21 pages.

A review of policies and practices with respect to Federal Support of Scientific and Technical Publications is presented.

Communication in science occurs largely through the publication of papers in journals and through meetings; however, because meetings cannot be attended by all, the printed work serves as the primary communication vehicle. Furthermore, it is less costly than personal contact, it reaches more people, and it can be stored for further use. Nonetheless, scientific publishing is expensive due to the nonprofit status of many publishing societies and the peer review process. Secondary publications have become so voluminous in some fields that they are acquired almost exclusively by libraries. In 1930, the device of the page charge was introduced to help reduce the burden of supporting publications that fell to individual subscribers. This report summarizes the findings of a review of page-charge policies and analyzes the collected data upon which new policy options in the Federal government may be based.

Page charges average about $50 per page of published material, and about half of professional society publishers interviewed do levy a charge. Not all Federal government agencies support research and development in science and technology; therefore, page-charge practices would be relevant only to some. Of nine agencies approached in the study, all are willing to pay, but variations exist as to the extent of written commitments. Page charges paid by agencies are allocated from monies in the agencies' research and development budget. Federal agency policies are not standard in this matter.

The author concludes that instead of, or in addition to, subsidies paid for individual articles, the Federal government can contribute to science publication in a

variety of ways. It can support publication research and development through indirect subsidy, i.e., research grants. Support can be given to users of science publications thereby allowing the consumer to judge which journals will survive and flourish. Finally, the government could avoid funding publication programs. A combination of these options is possible and necessary.

057 Creps, John E., Jr.; John H. Veyette, Jr.; Mary Ellen Padin
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Grant: GN-42269
Date: May 1976

ESTABLISHING AND MARKETING AN ENERGY INFORMATION SERVICE. FINAL REPORT. 18 pages.

Availability: Contact Engineering Index, Inc.; NTIS, PB 259 297

Because an "energy problem" and a heightened interest in all aspects of energy technology have recently emerged, Engineering Index (Ei) felt that there was need for an independent energy data base and its derived products. This Energy Data Base would have, as its core, the relevant material from the basic Ei Bibliographic Data Base with augmentation from cooperating secondary publishing sources. Aside from increased coverage, it was felt that Ei could achieve a wider distribution of this information than is possible with more common products for reasons of lower cost and diffusion of the energy information, not only through the larger book form, but also through convenient, smaller subsets priced suitably for small group subscription. The products of the data base would include five subsets of abstracts covering the sources, production, utilization, conservation, and conversion of energy and a cumulation of all five subsets into a combined product.

Ei started building the Energy Data Base in January 1974 when indexing and abstracting for the April issues began. Before this, Ei conducted an evaluation of the current literature to es' mate the sales volume for the subsets and the combined product. Through 1974, the data for the system were derived from the Ei Data Base only; in 1975, Ei included data from NTIS and ERDA. ENERGY Abstracts became a discrete product whose value increased as coverage from external sources increased.

Because ENERGY Abstracts attained a lower market acceptance than was anticipated, Ei, Inc., suspended publication of the five subsets at the end of 1975. However, the principal publication has become an established product. Negotiations between ERDA and Ei have led to a contract permitting ERDA to obtain energy materials from Ei. Ei is continuing an active campaign by direct mail and advertising to market ENERGY Abstracts. Sales goals call for a 17% increase in subscriptions for 1976.

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Grant: GN-42372
Date: July 1976

AN INTRODUCTORY GUIDE TO THE SELLING OF INFORMATION PRODUCTS AND SERVICES TO AGENCIES OF THE U.S. GOVERNMENT. 102 pages.

Availability: NTIS, PB 261 516

This guidebook was developed to provide answers to key marketing questions for organizations in the private sector that sell products and services in the information marketplace and to the government. It is hoped that the guide will stimulate elements of the private sector to pursue more active relationships with government agencies. This could lead to more effective utilization of that sector by the government as well as a reduction of the tendency for agencies to develop somewhat closed, in-house services.

There are four main chapters in the guide. First, the introduction outlines some background material and describes specifically who should use the guide and how it is arranged. Second, the government marketplace is described with special reference to sources of information concerning projects which the government is willing to fund. Third, the guide outlines the opportunities offered from each department for information services. Fourth, marketing concerns such as type of contract, overall strategy, and proposal form are discussed. The appendices contain a list of references regarding Federal information concerns, agencies from which the government publications can be obtained and detailed descriptions of contract type.

The guide includes several foldout charts and organizational charts to inform the marketer about his prospective buyer, the government. From the outset of the project, the concern has been to produce a set of guidelines that would be readable, practical, and immediately useable

to marketing personnel in the private sector. The ultimate aim of the guide is to support a more fruitful relationship between the Federal government and private information sources.

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Grant: SIS 75-15329
Date: July 1976

DEVELOPMENT OF A SHORT COURSE TO STIMULATE THE USE OF ON-LINE BIBLIOGRAPHIC INFORMATION RETRIEVAL IN THE COLLEGE SCIENCE CLASSROOM. 80 pages.

Availability: NTIS, PB 261 520

The development of a short course to stimulate the use of on-line bibliographic information retrieval in the college science classroom is discussed.

The approach used in this work was to expose science majors, through their professors, to the benefits of scientific information usage during their undergraduate development. An intensive short course for science professors encouraged the professors to incorporate information-related material in their classes. This approach overcame two difficulties in the teaching of information sources: a trained librarian may not want to assume the role of user educator, and students are not inclined to take courses which are not offered by regular science faculty members.

Some of the subjects covered in the first session of the course for professors included an introduction to information retrieval and search by computer, a survey of significant computerized technical information files, and a description of about ten novel applications for use of computerized information retrieval in college science teaching. The participants were given a chance to develop and implement unique classroom applications of the educational concept in interim projects. The second session consisted of a review of participants' projects and a survey of several special purpose information files.

The short-course program is an excellent forum for presenting this concept to groups of college science professors. As a result of experience gained in the first offering, some changes and improvements should be incorporated into the short course. Some of these are the

preparation of a trifold brochure which gives more information than is contained in the course description, incorporation of new classroom utilization case studies documented by the participants of last year's course, and preparation of better descriptions of the various data bases available for searching. During the academic year 1975-76, 65 persons attended the short course.

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Grant: DSI 75-12752 A01
Date: July, August 1976

INDUSTRIAL PARK INFORMATION CENTER FEASIBILITY STUDY: Vol. I. Survey Analysis Report, July 1976. Vol. II. Survey Instruments, July 1976. Survey Analysis Summary Report, August 1976.

Availability: Contact authors

A study to determine the feasibility of an Industrial Park Information Center (IPIC) was conducted. The IPIC concept would combine a centralized, rent-paying, scientific and technical information facility providing services to industrial park tenants. By proving the IPIC concept feasible and desirable, industrial park designers and developers would be encouraged to include IPICs as important components of their enterprises. Two industrial parks were selected to be studied: the Prudential Business Campus, Horsham, Pennsylvania; and the King of Prussia Park, King of Prussia, Pennsylvania. The two parks differ in size and are in areas of different industrial density.

Questionnaires on information needs and library use were constructed for each of three user categories--Librarians; Scientists, Technicians, Engineers and Architects; and Administrators. These questionnaires were designed to determine who the users were, what their current and projected information needs were, how they presently fill these needs, and how satisfied they were with what they were getting (or not getting). In all, 129 potential IPIC users from 46 companies were interviewed with the help of questionnaires designed for the three user categories.

The generalizations based on the survey conclusively show both need and willingness to pay for at least abstracting and indexing services, individualized bibliographies, and on-line computer searching of

bibliographic data bases. Other services of less general interest which might be included in an IPIC are general bibliographies, state-of-the-art reports, and current awareness or selective dissemination of information services. The hypothesis that an IPIC could provide member firms of an industrial park with needed and useful information was demonstrated as viable and economically feasible.

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Grant: SIS 75-12798
Date: January 1976

A PROGRESS REPORT--BARRIERS TO EFFECTIVE UTILIZATION OF STI IN AN INDUSTRIAL SETTING. 58 pages.

Availability: Contact author

Gellman Research Associates, Inc. (GRA), and Bendix's Energy Environment and Technology Office (BEETO) are undertaking a study of barriers to the effective use of scientific and technical information (STI) in an industrial setting. The project is a 2-year effort, with the first year being directed at developing a methodology for the identification and evaluation of these barriers. The object of this paper is to present a conceptual framework upon which the data collection instrument will be designed.

The project is based on the assumption that barriers to the optimal flow and use of STI are real, identifiable, and researchable. The initial building block for the study, then, is a definition of barrier which is measurable and which can accomodate the diverse views of a variety of special interest groups. The project workflow has been organized into ten phases, encompassing both years of the project. This report represents the completion of the first four phases, namely, the description of the Bendix Corporation, the conceptual framework, identification of variables, and finding prototype data requirements. Through the use of flow charts, the behavior routine for information gathering is detailed with accompanying narrative.

A barrier in this study is defined as a condition which creates a variance between an "idealized norm" and actual behavior in the movement of information from one location to another. The "idealized norm" is a path or pattern of behavior for meeting an information need as viewed by a special interest group. The "idealized norm" is not ideal,

but rather the consensus of opinions espoused by the majority of the members of any particular interest group. The definition of barrier and the identification of the "idealized norm" of information-seeking behavior sets the stage for the development of a methodology which will test the framework presented here.

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Grant: DSI 76-15422
Date: October 31, 1976

REVIEW POLICIES AND THEIR EFFECT ON JOURNAL QUALITY. 30 pages.

Availability: Contact author

This report studies the value of the article referee system and reviews the time needed to process an article for publication so that the already delicate, time-consuming, and voluntary reviewing system will not be damaged as efficiency increases.

Several reviewer policies were examined for their effect on average journal quality, and yet another reviewer or referee policy was proposed that circumvents the whole process if sufficient concurrence by reviewers is obtained early in the review period.

Several conclusions result from comparison of alternative ways to use referee recommendations in selection of articles to be published in a journal. They depend on the average submitted article quality and publication constraints. Journals which are constrained to publish a small proportion of submitted articles have a lower total output quality than journals which have fewer constraints. If the editor of the journal uses the policy of publishing articles even though they receive one unfavorable recommendation, the average published article quality exceeds that of a journal which publishes a higher proportion of submitted articles. Of course, the editor must then use more referees to separate the submitted articles to meet his publication constraints. Sequential review by an editor improves output quality at the cost of the time interposed between review and publication. However, a short-circuit policy of accepting articles prior to receipt of all referee reports if all the recommendations in hand are favorable has a relatively low probability of erroneously accepting bad articles.

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Grant: EPP 74-11549
Date: August 1976

DEVELOPMENT OF SCIENTIFIC CAREERS: THE HIGH SCHOOL YEARS. FINAL REPORT. 206 pages.

Availability: ERIC, ED 129 607

This document grew out of a concern to increase the understanding of the processes by which today's high-school students move toward or away from careers in science. Specifically, there was concern about whether the lack of women and ethnic minorities in science might be related to a lack of some types of career guidance information in high school. This research grant aided in the study of "the career guidance factors that affect the development of high school students' scientific potential."

In the course of the project, the development of the careers of 1200 scientists who were in high school in 1960 and who have contributed their responses to the Project TALENT survey over the intervening period were examined. Also essential for the study were the responses of 22,500 other Project TALENT participants not pursuing science careers. The rationale for this report was that there are career guidance factors that may intervene at the high-school level, resulting in the more successful development of careers in science. These factors were empirically explored, using the responses of Project TALENT participants and of a sample of 1,142 of today's high school students who were questioned concerning their career plans.

The results reveal not only some changes that have taken place during the last 15 years but also continuing barriers to the scientific development of women and members of minority groups. The 1975 sample exhibited less influence of sex roles on science career plans; however, large differences were still evident between various ethnic groups: 14% of the blacks, 15% of the Spanish-surnamed students, 23% of the whites, and 29% of the Orientals had science career plans. Students displayed some knowledge of their own abilities, interests, and values; of the characteristics of people in various occupations; and of the educational requirements and salaries in those occupations. However, several distinct knowledge deficiencies observed may inhibit establishment of careers in science.

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Grant: GN-42271
Date: May 1976

AN OPERATIONAL EXPERIMENT FOR THE MARKETING OF SCIENTIFIC AND TECHNICAL INFORMATION INNOVATIONS. 153 pages.

Availability: NTIS, PB 261 578

The transfer of scientific and technical information (STI) may be viewed as having three steps. These are (1) the collection and cataloging of relevant information; (2) the retrieval of desired information; and (3) the dissemination of information so as to benefit society through more efficient technological innovation. The National Science Foundation has sponsored a variety of projects over the years to accomplish the first two steps. A remaining problem has been the lack of widespread usage of some of the STI products and innovations, thus preventing NSF's investment in STI technology from reaching its full potential. The current project was funded to test the appropriateness of marketing techniques to expanding the use, and therefore the value to society, of STI. The objective of the current project is to identify the markets for STI and suggest general marketing approaches to meet these needs.

A two-phase program was used. The first phase consisted of an informal investigation of the STI market, the products and services currently available and the marketing approaches that have been developed. This step was necessary because little previous research had been done in these areas, and the results of such research were essential input to a more structured, scientific market segmentation and behavior study. Phase two was a major segmentation study of 274 persons in 171 manufacturing firms in the Commonwealth of Pennsylvania. The firms were stratified by size and distributed across the 11 Standard Industrial Classification codes that NSF had identified as research intensive.

The data were analyzed and provided the basis for the results reported herein. In general, the results support the hypothesis that there are a variety of segments of the STI market. Specifically, the STI market contains five segments, each wanting a different product when analyzed by what is important to them. Further, the market can be segmented on the basis of size. The purchasing behavior and product(s) desired vary among small, medium, and large firms.

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Grant: OEP 76-00502
Date: 1976

ANNUAL REVIEW OF ENERGY.

Availability: Contact Annual Reviews, Inc.

This series is a continuing review and discussion of the significant issues related to energy, the technologies of energy generation, and end-use; regional and global energy systems; environmental and societal impacts of energy systems; the economics and politics of energy; and scientific and research frontiers in energy.

The Annual Review of Energy will not attempt to cover the entire spectrum of energy topics each year but will develop a cyclical inclusivity that will allow thorough review of selected subject areas each year.

In place of extensive technical detail, the reviews in Volume 1 emphasize technical and other issues that are playing a central role in the development of the energy system of the United States--issues which affect and are affected by U.S. energy policy. In the same manner, and with the same philosophy, Volume 2 will review salient aspects and issues of the global energy system.

066 Kent, Allen
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Grant: DSI 75-11840
Date: July 21, 1976

INFORMATION SCIENCE. Presented at American Library Association 95th Conference, Chicago, Ill., July 21, 1976. Journal of Education for Librarianship, Vol. 17, No. 3, October 1977, pages 131-139.

Availability: See journal article

The interface between librarianship and information science is discussed. The author emphasizes the growing impact computers and information science have on library careers. He feels that specially designed computer courses with direct library application should be taught in library schools. A familiarity with complex mathematics would not be

necessary for a course in computer principles and programming he recommends. He feels that integrating computer experience, including quantitative aspects and system analysis, with other coursework could be valuable if taught competently.

Areas of research in which information science tools are being applied to library problems are resource sharing, resource simulation, and cost-benefit models of library operations in terms of use.

Simulation, modeling, and statistics are being used as important tools in connection with library network design, resource sharing decisions, and even book selection.

The author concludes that knowledge of information science is a necessary professional tool for those involved in future library science work.

Other publications:

066a Montgomery, K. Leon; Stephen Bulick; John Fetterman COST-BENEFIT MODEL OF LIBRARY ACQUISITIONS IN TERMS OF USE: PROGRESS REPORT. Journal of the American Society for Information Science, Vol. 27, No. 1, January-February 1976, pages 73-74.

A project has been undertaken to study the use of library materials, to evaluate acquisition decisions in terms of subsequent use, and to derive a cost/benefit model for use in purchasing and resource sharing and in the elimination of little-used materials. This first progress report considers only circulating books and monographs. Data derived from circulation records are analyzed in terms of the number of uses per individual item.

A surprising result is the consistent halving of the number of items circulated with each successive increase in number of uses. These results are consistent over each of 5 years studied. The phenomenon is not yet explained. In addition, it is observed that only half of the collection is circulated one or more times over a 5-year period.

066b Bulick, Stephen; K. Leon Montgomery; John Fetterman USE OF LIBRARY MATERIALS IN TERMS OF AGE. Journal of the American Society for Information Science, Vol. 27, No. 3, May-June 1976, pages 175-178.

The use of books and monographs is studied in terms of obsolescence. Data on the use, over a period of 5 years, of materials acquired in 1969 is presented in such a way as to indicate the ponts at which negligible use can be predicted. This methodology will be used for successive years of acquisitions and the data will be compared. An attempt will be made to develop a predictive model on aging which may be useful both in purchasing and file-purging decisions.

066c Galvin, Thomas J.; Allen Kent
USE OF A UNIVERSITY LIBRARY COLLECTION. Library Journal, Vol. 102, No. 20, November 15, 1977, pages 2317-2320.

The progress on a study to determine the extent to which library materials are used and to assess the full cost of that use is reported. The objective of the project is the development of the foundation for improvement of library requisitions decisions, determination of the point when materials can be removed from the collections or placed in low-cost remote storage facilities, and assessment of the critical points at which alternatives to local ownership are economically feasible. The study, conducted at the University of Pittsburgh, indicated that a very small portion of the library's total collection accounts for the major portion of books used and a great majority of those titles that will ever be used initially during the first 2 years following their acquisition. The theory that shows a high positive correlation between subjects of books that circulate externally and those used in-house is validated by the study. Current studies should indicate which Library of Congress (LC) classes of books are used most frequently and should therefore be ordered by libraries.

Journal use, with special emphasis on science and engineering is also being evaluated. Preliminary results indicate that a high percentage of use is related to a very small portion of the total journal collection.

067 King, Donald W.
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Contract: C-878, DSI 75-20535
Date: December 1976

STATISTICAL INDICATORS OF SCIENTIFIC AND TECHNICAL COMMUNICATION: 1960-1980. Vol. 1. A Summary Report. 99

pages.

Availability: Contact King Research, Inc.

The development of a system of statistical indicators of scientific and technical (S & T) communication is discussed. S & T communication has become increasingly difficult and complex as the number of persons engaged in science and technology multiplies, as the breadth and depth of scientific knowledge grows correspondingly, and as the need for multidisciplinary scientific research becomes more prevalent. To date, there is no cohesive set of data that measures the extent of communication performed by various media or by the channels used to transfer scientific and technical information.

In order to develop this system, it was necessary to study hundreds of secondary data sources and from these sources derive a small number of indicators that portray the direction of S & T communication over the past and into the future. To the extent possible, all data collection was conducted in terms of fields of science used by the National Science Foundation including physical science, mathematics, life sciences, and social science. General indicators were derived for the growth over recent years of specific forms of literature including books, journals, government-sponsored reports, and others. The general economic outlook for each form of literature was also investigated.

A total of 77 tables at the end of the volume presents the statistical indicators that were investigated during this study. Examples are total communication resource expenditures, number of published conference proceedings, growth of U.S. scientific and technical literature forms, and number of items produced per scientist or engineer.

Other publications:

067a King, Donald W.; F. W. Lancaster; D. D. McDonald STATISTICAL INDICATORS OF SCIENTIFIC AND TECHNICAL COMMUNICATION (1960-1980), Vol. II. A Research Report. May 1976. 477 pages.

Availability: NTIS, PB 254 060

One source of assistance for management of the national scientific and technical information (STI) enterprise is in the form of data and statistical indicators that can be used for planning and policy purposes. A study was designed by

the Center for Quantitative Sciences to examine potential statistical indicators through five major tasks--a background study, development of a framework for the indicators, data collection, development of the system of statistical indicators, and reporting.

This second volume is an STI Communications Statistical Indicators Research Report concerning the analysis of data leading to the system of statistical indicators. It includes description of the framework leading to the system of statistical indicators as well as the analysis and mathematical models used to generate them. This volume will be of interest to those engaged in research involving communication of STI and will also serve those who are interested in the details of how the system of statistical indicators was derived.

067b King, Donald W.; D. D. McDonald; N. K. Roderer
STATISTICAL INDICATORS OF SCIENTIFIC AND TECHNICAL COMMUNICATION (1960-1980), Volume III: A Data Appendix to Volume II. May 1976. 313 pages.

Availability: NTIS. PB 255 503

In the study of statistical indicators of scientific and technical communication, a major focus is on the consideration of the scientific journal. The Center for Quantitative Science conducted two survey efforts to gain additional data on journal publishing.

The first survey, the Journal Tracking Survey, involved a sample of 191 scholarly scientific and technical journals. These journals were tracked back to 1962 to obtain information about their physical characteristics such as number of issues per year, number of articles per issue, number of pages per article, number of characters per page, number of special graphics, and number of citations. The second effort, the Author Survey, involved a survey of authors of journal articles to gather information about their articles such as page charges, reprints distributed, and number of manuscript revisions. This volume presents data obtained in the Journal Tracking Survey for individual journal titles.

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Grant: SIS 75-00273

Date: September 1, 1976

AN INVESTIGATION OF PLANNING REQUIREMENTS AND PRIORITIES OF THE SCIENTIFIC AND TECHNICAL INFORMATION COMMUNITY. 108 pages.

Availability: Contact ASIS

The project sought to provide the Division of Science Information (DSI), now Division of Information Science and Technology (IST), with valid information on the perceived needs of the various groups within the scientific and technical information (STI) community which could be used by DSI as the basis for the planning and development of a comprehensive National Program Document describing the goals, objectives, and priorities of this community.

The work undertaken included: (1) a survey which identified major needs and categorized the short- and long-range requirements of the STI community; (2) a feedback process wherein American Society for Information Science (ASIS) Chapters produced written responses and held discussions on the needs addressed in the study; (3) a further critique of these needs through panel discussions between ASIS staff and attendees at ASIS Mid-Year and Annual Meetings; and (4) a series of issue papers written as further guidance to planners of national STI programs under the broad categories of Fundamental Research, Applied Research, User Education, and Coordination.

Among the high-importance needs perceived by those participating are improvement of national coordination among STI services, encouraging the abstracting and/or indexing of new information, and fostering the development of networks among STI services. For these findings, it is possible to offer some recommendations for the future. A nationally coordinated STI policy is desirable, and Federal resources should be appropriated to initiate and support the development and implementation plans. Furthermore, needs in the high-importance group should receive major funding attention in the short term with a high priority toward development of networks and document-delivery services.

069 Kuipers, J. W.; R. W. Thorpe; F. W. Lancaster
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Grant: SIS 75-12766
Date: June 30, 1976

FACTORS IN THE PLANNING OF A NATIONAL INFORMATION SYSTEM FOR

RENEWABLE ENERGY. 175 pages.

Availability: NTIS, PB 262 003

A national information system dealing with the subject of renewable energy is proposed as the major communication medium for this field. The system intends to serve the scientific and technical communities as well as the managerial policy-making and public components of the energy field. In order to achieve improvements in communication between and within information communities, a system should be established which contains a distributed network of satellite centers and a coordinating headquarters center. The satellite centers in the system would be Information Resource and Analysis Centers (IRACs), one for each particular information area. Each designated IRAC would be responsible for acquiring, organizing, and maintaining all information of interest in the given information area.

This document describes the proposed functions, operations, and management responsibilities for the system. It also presents results of studies concerning the present status of scientific communication, the relative value of various sources in the provision of current awareness information, information gathering behavior of scientists, and proposals for current-awareness services.

The study shows the many ramifications and the variety of choices which are possible in planning for a comprehensive national information system. It is projected that the system will provide the basic capabilities to improve both the formal and informal channels of communication. This national information system is most important as a resource in the management and exploitation of national energy programs. The system is also an essential step toward the realization of an all-electronic mode of communication in the renewable energy field.

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Grant: GN-42062
Date: July 1976

INTERCHANGE OF DATA BASES--FINAL REPORT. 96 pages.

Availability: NTIS, PB 272 502

In this effort, the American Institute of Physics (AIP) and Engineering Index, Inc., (Ei) developed methods by which both organizations could reduce their input costs by eliminating duplication of intellectual effort and processing. Both services have computerized data bases which are used to produce bibliographic tape services and various computer-photocomposed printed products. It was expected that interchange capability would allow AIP and Ei to work together on the production of new services in the area where engineering and physics overlap. These overlaps are generally in the area of applied science and instrumentation.

At the present time, Ei chooses about 5000 items per year from journals and conference proceedings published by AIP. For certain of these journals, Ei includes complete journal issues; for other journals, articles are selected on the basis of subject content. Using a programmed option of choosing articl_ by CODEN or by classification, AIP could select items for Ei and deliver them on magnetic tape, indexed and formatted as specified by Ei; Ei would thus save on keyboarding and indexing costs. On an exchange basis, AIP would be able to increase its coverage by acquiring material not currently processed by AIP, including technical reports, standards, and selected books.

In order to make such an interchange possible, it was necessary to solve three problems: differences in classification and indexing schemes, varying formats for magnetic tape and differing data elements, and special characters used. The project concluded with the successful interchange of computer tapes between AIP and Ei containing indexed abstracts from selected journals for inclusion in each other's services and products.

071 Lerner, Rita G.; Robert D. Feinman; Irving Lieblich
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Grant: GN-41763
Date: July 1976

DATA-DESCRIPTIVE RECORDS IN THE PHYSICAL SCIENCES. FINAL REPORT. 59 pages.

Availability: NTIS, PB 266 770

The American Institute of Physics (AIP), in cooperation with a group of data centers from the National Standard

Reference Data System and a group of primary journal editors, studied ways in which primary and secondary publishers could assist data centers and individual scientists and engineers in carrying out their functions. The subject area of condensed matter was chosen for study and testing. A form was designed for use by authors in assigning data flags and tags to their manuscripts, and instructions for filling out the form were drawn up. The data flags symbolized broad categories which had been chosen from AIP's hierarchical Physics and Astronomy Classification Scheme.

Samples of tagged and flagged articles were circulated to data centers and editors; the final version of the tagging form represents a consensus. The data tags are in a faceted, free-language format; each piece of data is described by a combination of facets in a prescribed order.

The method proposed is considered to be applicable to all areas of physics, and could be equally hospitable to the display of data from the fields of engineering, chemistry, and biology. The authors recommend an experiment in which the proposed system is tested with the authors and editors of a set of journals. The results of author tagging and subsequent publication of the tags and flags would be evaluated by data centers in the relevant areas of physics.

Other publications:

071a Lerner, Rita G.
ACCESS TO THE PRIMARY LITERATURE. In Sourcebook on Handling Scientific and Technical Data; eds. Rossmassler, S. A., and D. G. Watson, UNESCO, to be published.

Six current experiments in developing data-descriptive records for the primary and secondary literature are described. The author states that the most promising approaches for attacking data-descriptive records to abstracts and bibliographic citations at the time of publication are based on the data-flagging and tagging in the primary and secondary literature.

Access to the primary literature through secondary services and acquisition of the full text of primary documents are discussed. Abstracting and Indexing Services, their purpose, scope, and availability are considered. The author feels that an effective system for data-descriptive records will require the cooperation of primary publishers, abstracting and indexing services, and data centers to

develop compatible and interchangeable methods. These groups will also have to work with libraries to ensure the availability of the primary literature.

In addition, all of this must be accomplished in a practical and economic way.

071b Lerner, Rita G.
DATA TAGGING IN PHYSICS. Proceedings of the 5th Biennial International CODATA Conference, Pergamon Press, Ltd. June 1976.

A data-tagging framework for the data display to be used in physics is described. A system in which the author of an article would supply the data tag so that it could be printed along with the article in the primary journal is outlined. Five possibilities for data tagging were explored and a form was designed which used expansion of the notation of content or key phrases concept. An instruction sheet directed to the authors aids in filling out the form. The author hopes that a similar format could be extended to include data from other disciplines such as chemistry, biology, and engineering.

071c Lerner, Rita G.
LOCATING AND DESCRIBING DATA IN PRIMARY JOURNALS. Bulletin of the American Society for Information Science, Vol. 1, No. 7, February 1975, page 13.

This article discusses the editor and the reference system in terms of the need for intellectual access, the irony of interest in data-descriptive records at a time when publishers are trying to minimize data (and therefore space) in papers, the emergence of data journals, and the role of the data by the author, reviewed by the editor, and published with the abstract in the printed journal and in any related computer-readable services.

072 Marcus, Richard S.; J. Francis Reintjes
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Grant: SIS 74-18165
Date: March 31, 1976

THE NETWORKING OF INTERACTIVE BIBLIOGRAPHIC RETRIEVAL SYSTEMS. 164 pages.

Availability: NTIS, PB 252 407; ERIC, ED 125 533

In the last 10 years, there has been a rapid development of techniques for transferring information among individuals representing a common community of interest. Computerized systems of the future may be able to combine full-text retrieval, data base storage, and processing of data into natural language in one master information transfer system. This type of system can only be developed in a computer network environment in which computer interfaces link users to several systems at once.

The work at M.I.T. on an experimental interface entailed several thrusts of study at once. At first, an interface was developed which connected four retrieval systems and a total of 50 data bases. A modest degree of translation of system responses to a common format and the beginnings of an instructional mode were implemented. The research team also developed general principles of user/system interaction for on-line systems, and work continued on a common command language. Identification of the necessary elements for successful interprocess message communication between systems and human users was helpful in the production of a model which would explain human/computer interaction in the interface situation. Common retrieval protocol and software modules for translation were also part of the model.

Research on the networking of heterogeneous interactive information retrieval systems has supported the belief in the value of virtual system computer interface as a means to achieve networking. In part, the evidence for this result has come from the researchers' initial testing of the experimental interface called CONIT. The research has suggested that a practical, operational interface might be developed which would relieve the need for a trained intermediary searcher. Fruitful areas of additional efforts include the extension of interface capabilities and the design of interface structures so that they enhance efforts toward standardization in information processing.

Other publications:

072a Marcus, Richard S.
NETWORKING INFORMATION RETRIEVAL SYSTEMS USING COMPUTER INTERFACES. Proceedings of the 38th Annual Conference, Vol. 12. American Society for

Information Science, October 26-30, 1975, pages 77-78.

The researchers are optimistic in this paper about the feasibility of at least some form of the translating interface/virtual system approach. They believe there is sufficient utility in even an approximate translation to make the translating interface approach a worthwhile one. How close to perfect translation one can come, how costly that would be, and how much more useful it would be are subjects for further investigation.

072b Marcus, Richard S.
SUMMARY OF THE NETWORK RESEARCH PROJECT. ASIS SIG Newsletter No. UOI-6, May 1977, pages 4-5.

A brief summary of the M.I.T. Network Research Project is presented. The project's goal is to make it easy for individual users of information to engage the investigated retrieval systems despite their different operating characteristics and protocols.

Research is being conducted, in part, through the development of an experimental virtual system, CONIT (Connector for Networked Information Transfer). CONIT, which is structured as a translating computer interface, connects a user to four systems: National Library of Medicine (NLM) and SUNY MEDLINE, Lockheed DIALOG, and SDC ORBIT. A simple command/argument language approach with much online instruction (CAI) has been adopted to assist inexperienced users. Recent user tests with this experimental interface have demonstrated a considerable degree of success for these techniques while also indicating basic trade-offs and limitations in their implementation in operational systems.

Future plans call for additional experimentation as well as investigations of more sophisticated interfaces that would automatically, or with user assistance, select the appropriate data bases and find optimum search strategies for a given search.

072c Reintjes, J. Francis
THE VIRTUAL-SYSTEM CONCEPT OF NETWORKING BIBLIOGRAPHIC INFORMATION SYSTEMS. NATO Advisory Group for Aerospace Research and Development (AGARD) Conference Proceedings, No. 207 (Advancements in Retrieval Technology as Related to Information Systems). Institute for Defense Analyses, Arlington, VA, October 20-21, 1976, pages 9-1 to 9-7.

This article describes briefly a networking information retrieval system in terms of how much "virtualness" should be attained or expected. The emphasis of the article is on examples of user dialog. Four of the five host bibliographic systems--Lockheed, SDC, MEDLINE at the National Library of Medicine and at SUNY-- are accessed through Tymshare. A Terminal Interface Processor (TIP) network patch permits access to the fifth, the local M.I.T. Intrex data base. In order to connect into any system, the user specifies his choice to the experimental interface called (CONIT) through the PICK DATA command. During the developmental period several other commands have been implemented and defined, one of which controls browsing.

073 McCartney, James L.
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Grant: DSI 75-22929
Date: August 1976

WORKSHOP FOR SOCIOLOGY EDITORS, August 23, 24, 1975.

Availability: Contact author

A workshop for Sociology editors was conducted August 23-24, 1975 to discuss problems encountered when publishing sociology journals.

Other publication:

073a McCartney, James L.
CONFRONTING THE JOURNAL PUBLICATION CRISIS: A PROPOSAL FOR A COUNCIL OF SOCIAL SCIENCE EDITORS.
The American Sociologist, Vol. 11, August 1976, pages 144-152.

Availability: Contact author

A proposal is presented for a council of social science editors which would serve as a middle-range group to mitigate some of the most urgent publishing problems and also serve as a catalyst in planning to preserve an effective social-science communication system. Problems of sociology journals in areas of cost and structure are reviewed. Some suggestions for caution on part of the council of editors are presented.

074 Murdock, John W.; John Sherrod
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Grant: SIS 75-12715
Date: August 1976

PRACTICAL INFORMATION NETWORKING: AN EXPERIMENTAL DESIGN FOR EARLY DEVELOPMENT OF NATIONAL INFORMATION SERVICES. 40 pages.

Availability: NTIS, PB 258 035

With the recognized shift of Federal expenditures from the military-space realm to domestic, societal problemsolving, new interest is emerging in the ability of our information systems to transfer the results of scientific research to society at large. Federal information policy often develops as a result of interactions between individuals and institutions in the legislative and executive branches of the government and any number of advocate groups whose efforts are focused on a particular cluster of program objectives. In the absence of any policy for undertaking national information programs, ways must be found to introduce improved information sharing into the system-building process. The first step is to draw a plan after carefully defining the means for planning successful information structure.

The study is concerned with the outside input that may be available to an executive agency during its deliberations on choices of information program options, particularly in a crisis situation, i.e., when congressional action mandates the establishment of a new information program in the executive agency. A model approach is proposed which does not claim to offer a definitive answer to the problem. The authors begin to develop the model by defining its elements in general and then applying these to the situations which may arise in the Federal government. The models are described, particularly the Procedural Model, which includes the steps by which an information system can be implemented, operated, and evaluated.

The model study makes clear the concepts involved. The existing range of data bases and services is probably adequate to build a national coordinated information system. The initial efforts must be followed by the development and maintenance of a comprehensive catalog of resources that can be consulted when the need arises. The catalog should be readily accessible to each new program manager and decision-maker. Finally, the efficacy of the approach must be demonstrated through application of the concepts in a live program system.

075-1 Niehoff, Robert T.
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Grant: GN-42243, DSI 74-15285
Date: February 1976

DEVELOPMENT OF AN INTEGRATED ENERGY VOCABULARY. FINAL REPORT. 27 pages.

Availability: NTIS, PB 253 781

Efforts to develop an integrated energy vocabulary began as part of a four-task study in April 1974. Results were reported in November 1974, but the vocabulary was incomplete at that time. The objective of this follow-on study was to determine missing thesaural origins for energy terms previously identified and to reprocess the entire vocabulary using thesaurus maintenance software routines. The scope originally conceived for an integrated energy vocabulary was not changed; however, the American Institute of Physics Subject Classification Vocabulary was dropped from the program. Thus, ten system vocabularies were left for further study.

Work to complete the integrated energy vocabulary began with the earlier draft compilation and proceeded through several steps. First, a vocabulary analysis was undertaken to ascertain the thesaural origins of all terms. The terms were then coded so that their origins would be identified in the final integrated vocabulary. The additional vocabulary data were keyed into the main system according to previous conventions. Second, the vocabulary records were processed by computer with the use of a program called Thesaurus Build. Finally, a protocol was developed which could convert any vocabulary word into the preferred term in any other vocabulary list. The report details all these steps with emphasis on the computer/conversion aspects.

The study demonstrated the true "Tower of Babel" nature of indexing vocabularies, the nuances of each, and the need for good subject switching techniques to overcome these problems. Where one vocabulary is weak, another is strong, and there appears to be a genuine synergistic effect in combining these vocabularies into an itegrated whole. Greater utilization of information resources, in particular, on-line bibliographic retrieval systems, will depend in some great measure on whether a way can be found to overcome the subject-access barrier brought about by differing and sometimes incompatible vocabularies. The integrated energy vocabulary will greatly aid energy researchers and information scientist intermediaries in locating energy-related information and/or assist them in stating

their problem. The vocabulary should be particularly valuable as a temporary retrieval aid for users of both manual and on-line systems.

075-2 Niehoff, Robert T.
INTEGRATED ENERGY VOCABULARY 1976.

Availability: NTIS, PB 259 000

The Integrated Energy Vocabulary is a compilation of some 30,000 scientific and technical terms covering the broad subject of energy research and development. The different information system vocabularies were used as sources of terms. This product represents the largest vocabulary of its kind ever produced, and it also represents one of the few integrated or merged vocabularies ever printed. It contains more terms from more sources than any previous effort and probably stands alone as the largest collection of energy terms to date. Although the product resembles an indexing and retrieval thesaurus in many ways, it contains terms from various types of vocabularies, and so the compilers have referred to it in a more generic sense as a vocabulary rather than a thesaurus.

The primary purpose of this vocabulary is to assist seekers of energy information with search strategy formulation using energy terminology appropriate to the data base(s) to be searched and determining which data base(s) or information system(s) to search with a given energy term. In other words, this publication will aid the searcher to find the right data base and/or the right term for his search.

The vocabulary can also be used as a guide for indexing energy-related documents and as a reference tool for developing microthesauri on energy research and development and for further studies of vocabulary compatibility and convertability. It is currently being used to test and study the possibilities of on-line subject switching in multiple data-base environments with the eventual goal of obviating the requirement of search vocabulary proficiency on the part of on-line users. Hopefully, greater utilization of existing information resources will be realized through use of this printed, integrated vocabulary and, eventually, the on-line version of it.

Other publication:

075a Niehoff, Robert T.

DEVELOPMENT OF AN INTEGRATED ENERGY VOCABULARY AND THE POSSIBILITIES FOR ON-LINE SUBJECT SWITCHING. Journal of the American Society for Information Science, Vol. 27, No. 1, January-February 1976, pages 3-17.

This paper describes the development of an integrated vocabulary of energy terminology and explores the potential for a fully developed energy vocabulary conversion guide. Eleven vocabularies were analyzed and integrated. The author concludes that vocabulary conversion, which permits subject switching, offers some degree of intersystem compatibility. Conversion is the ability to retrieve all documents on a given subject from all available (and appropriate) data bases with a single query. When coupled with development of a standard system protocol, full information resource utilization will be possible.

076 Talavage, Joseph
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Grant: SIS 75-14772
Date: August 1976

A PROGRESS REPORT OF EIGHT-MONTHS EFFORT ON GRANT NO. SIS 75-14772, THE ECONOMIC CHARACTERISTICS OF INFORMATION ANALYSIS CENTERS.

Availability: Contact author

An 8-month progress report for a project which analyzes management policy for industrial information centers is presented. The objectives of the project are to investigate the financial aspects of scientific and technical information (STI) centers, with particular emphasis on industrial in-house centers, and on methodologies which can be employed to develop financing (including pricing) schemes for scientific and technical information centers. An extensive survey of the literature regarding the economics of information centers is presented, with emphasis on the issue of whether a fee should be charged for providing this service.

In order to gain a better understanding of current practices regarding center management, on-site interviews were conducted with seven governmental and industrial centers. Some important features of the centers are described from the perspectives of the nature of information sources, the variety and amount of product, the type of user

that is served, the level of technology employed, and several management factors including objectives, funding, and pricing policies.

A broader, though less detailed, view of industrial resource allocations to STI transfer will be sought by means of a questionnaire. Plans for the questionnaire dissemination are discussed.

The initial phases of development of an Information Center Management Systems model are described. This development represents an effort to unify the many and diverse approaches to center management.

The need for better characterization of information center users is considered, and an approach is outlined for employing models of the user which can be of benefit to the decision-making process of center managers.

077 Sager, Naomi
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Grant: GN-39879
Date: July 1976

EVALUATION OF AUTOMATED NATURAL LANGUAGE PROCESSING IN THE FURTHER DEVELOPMENT OF SCIENCE INFORMATION RETRIEVAL. FINAL REPORT. 104 pages.

Availability: NTIS, PB 266 948

Natural-language processing techniques are reaching the stage of useful application at a time when changes in the technology of information production and dissemination are making computerized, natural-language data bases widely available. Where computer-readable, natural-language data bases exist, there soon develops a desire for computer programs to process the data in this form. The purpose of this investigation is to match the emerging techniques in computerized, natural-language processing against emerging needs for such techniques in the information field, to evaluate and extend such techniques as seemed most promising for future applications, and to lay forth a basis for further research toward these goals.

The organization of the report reflects the evolution of the investigation. Section One presents a summary of developments in the information field which led to renewed interest in natural-language processing. The section also

shows how programs for processing natural language could fulfill new language-based functions of information systems. Section Two describes the stages of processing which transform largely unrestricted natural language input of the type encountered in scientific communication into data structures suitable for information processing. Research is reported in Section Three which entails cluster analysis for similarities of vocabulary and algorithm design. Section Four outlines applications, specifically, generating word lists and test descriptions, structuring natural-language data bases and improving user service. Section Five discusses the research goals in language and information.

As applicational efforts are encouraged, it should be clear that an important product of linguistic studies is the light they cast on scientific information. It is found that the recording of information uses language structure as the framework on which are built the specific symbolic relations carrying the specific information. The study of the relation between language structure and its semantic burden in scientific communication is already yielding results which, in addition to spawning applications, are revealing that further study of this relation will contribute to a general characterization of the structure of scientific information.

Other publications:

077a Anderson, B.; I. D. J. Bross; N. Sager
GRAMMATICAL COMPRESSION IN NOTES AND RECORDS: ANALYSIS AND COMPUTATION. American Journal of Computational Linguistics, Vol. 2, No. 4, 1975, microfiche 36, page 68.

Linguistic mechanisms of compression in the medical records of a collaborative study of breast cancer are described. The syntactic devices consisted mainly of deletion of words having a special status in the grammar of the whole language; the deleted forms are described. A corpus of medical records was experimentally parsed with the components of the deletions.

077b Fitzpatrick, Eileen; Naomi Sager
THE LEXICAL SUBCLASSES OF THE LINGUISTIC STRING PARSER. String Program Reports No. 9. Linguistic String Project. New York University. 1974. 69 pages. American Journal of Computational Linguistics, microfiche 2, 1974.

This paper defines the 109 adjective, noun, and verb subclasses of the New York University Linguistic String Parser (LSP). These subclasses, as well as others not presented here, are defined in such a way that they can be used as a guide for classifying new entries to the LSP lexicon and as a linguistic reference tool. Each definition includes a statement of the intent of the subclass, a diagnostic frame, sentence examples, and a word list drawn from the present dictionary. The subclasses have been defined so as to be consistent with a subsequent stage of transformational analysis that is currently being implemented.

077c Grishman, Ralph
THE IMPLEMENTATION OF THE STRING PARSER OF ENGLISH. In Randall Rustin, ed. Natural Language Processing. New York, Algorithmics Press, Inc. 1973, pages 89-109.

The organization of the latest implementation (in FORTRAN) of the string parser for scientific literature is described. The steps involved in compiling and running a programmed grammar are explained, and alternative schemes for increasing the speed of the parser are considered.

077d Grishman, Ralph, et al.
THE LINGUISTIC STRING PARSER. AFIPS Conference Proceedings (1973 National Computer Conference and Exposition), Vol. 42, Montvale, NJ, AFIPS Press, 1973, pages 427-434.

In this paper the authors briefly review the linguistic basis of the linguistic string parser (LSP) and describe the principal features of the current implementation. The LSP is a system for the syntactic analysis of English scientific text. The main thrust in the development of the current version of the parser has been to use modern programming techniques, ranging from higher-level languages and subroutine structures to syntax-directed translation and non-deterministic programming, in order to structure and simplify the task of the grammar writer.

077e Hirschman, Lynette; Ralph Grishman
FACT RETRIEVAL FROM NATURAL LANGUAGE MEDICAL RECORDS. Proceedings of the Second World Conference on Medical Inforonics (MEDINFO '77), IFIP World Conference Series on Medical Inforonics, Vol. 2, David B. Shires and Herman Wolf, eds., Amsterdam,

North-Holland, 1977, pages 247-251.

A procedure for fact retrieval from natural-language texts is described. First the natural-language material is processed syntactically and mapped into a table (information format), where each distinct type of information is placed into a separate format column. A set of normalization procedures fills in certain missing pieces of information from context. Finally each query is translated into a procedure which checks the columns of the information format and produces the desired answer. Nine implemented queries are listed for an automatically formatted data base of radiology reports for 13 patients, together with some sample answers for one patient's reports.

The adequacy of a formatted data base for fact retrieval is shown.

In constructing the formats and formatting the text, the authors have endeavored to develop procedures which are generalizable to other types of texts. The authors feel that this approach to retrieval from natural-language text should be useful in several areas.

077f Hirschman, Lynette; Ralph Grishman; Naomi Sager FROM TEXT TO STRUCTURED INFORMATION; AUTOMATIC PROCESSING OF MEDICAL REPORTS. Proceedings of the 1976 National Computer Conference. AFIPS Conference Proceedings, Vol. 45, Montvale, NJ, AFIPS Press, 1976, pages 267-275.

This paper describes the analysis and processing programs for a set of natural-language texts in a medical area (x-ray reports on patients with breast cancer). The programs convert the information in the text into a tabular form suitable for further automatic information processing (e.g., editing of records, question answering on the data collected, statistical summaries of the data). To set up a tabular form appropriate for the data, the authors first perform a manual linguistic analysis on a sample of the texts. From this they obtain the word classes and the form of the table (called an information format) for this type of material. They then apply the series of processing programs to the sentences of the texts. Each sentence is parsed with the Linguistic String Parser English grammar in order to obtain its grammatical structure; certain standard English transformations are then applied to regularize the grammatical form of the sentence; and finally a set of "formatting transformations" map the words of the sentence into the slots of the format or table in such a way that the sentence is reconstructible (up to paraphrase) from its representation in the table. The results of applying these

programs to a corpus are described. This procedure enables the authors to convert a natural-language corpus into a structured data base.

077g Hirschman, Lynette; Ralph Grishman; Naomi Sager
GRAMATICALLY-BASED AUTOMATIC WORD CLASS FORMATION. Information Processing and Management, Vol. 11, 1975, pages 39-57.

Most previous attempts at producing word classes (thesauri) by statistical analysis have used very limited distributional information such as word co-occurrence in a document or a sentence. This paper describes an automatic procedure which used syntactic relations as the basis for grouping words into classes. The program was applied to a small corpus of sentences in a subfield of pharmacology. This procedure yielded the word classes for the subfield in good agreement with the word classes recognized by pharmacologists.

077h Hobbs, Jerry R.; Ralph Grishman
THE AUTOMATIC TRANSFORMATIONAL ANALYSIS OF ENGLISH SENTENCES: AN IMPLEMENTATION. International Journal of Computer Mathematics, Section A, Vol. 5, 1976, pages 267-283.

The authors describe a system being developed for the transformational analysis of complex English sentences. The system is designed to be able to serve as the basis for a variety of applications, such as questioning-answering, information retrieval, and command systems. It is a two-stage system, with the first stage being the Linguistic String Parser previously developed at New York University. The structure of the system and its relation to contemporary transformational parsers are considered. Several transformations, including those for nominalization, are described in detail and several sentence analyses produced by the program are presented.

077i Raze, Carol
A COMPUTATIONAL TREATMENT OF COORDINATE CONJUNCTIONS. American Journal of Computational Linguistics, microfiche 52, 1976, 40 pages.

This paper reports on the implementation of a general method for recognizing conjunctional strings in text sentences. In particular, they describe the conjunction algorithm of the most recent implementation of the New York

University Linguistic String Parser (LSP). The algorithm provides for dynamic generation of definitions which cover a rich variety of conjoined word classes or word class sequences encountered in sentences. It also provides the basis for the transformational expansion of conjunction strings into complete assertions. The expansion transformation is currently operative and will be described in a later paper.

077j Sager, Naomi
COMPUTATIONAL LINGUISTICS PERSPECTIVE PAPER. Proceedings of the 1976 Workshop in Linguistics and Information Science. International Federation of Documentation, Committee on Linguistics in Documentation. (FID/LD). In press.

077k Sager, Naomi
COMPUTERIZED DISCOVERY OF SEMANTIC WORD CLASSES IN SCIENTIFIC FIELDS. In Directions in Artificial Intelligence: Natural Language Processing. Courant Computer Science Report No. 7. Courant Institute of Mathematical Sciences, New York University, 1975, pages 27-48.

A procedure is described here for automatically obtaining the semantic classes in a science subfield. This procedure is based on statistical cooccurrence data for words having particular relations in the text. The results of applying this procedure to a subfield of pharmacology are presented. Its use for structuring the information in natural-language texts is discussed.

078 Sager, Naomi
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Grant: SIS 75-22945
Date: 1977

INFORMATION STRUCTURES IN THE LANGUAGE OF SCIENCE. American Association for the Advancement of Science (AAAS) Selected Symposium 3, The Many Faces of Information Science, Edward C. Weiss, ed. Westview Press, Boulder, Colorado, 1977, pages 53-73.

Availability: Contact publisher

This paper presents results, and computer applications, of research into the relationship between language structure and information, particularly as it appears in the language of science.

Using the regularities observed in language material itself, the author has developed information-formatting programs for processing information in natural-language reports and articles.

The main practical implication of these information-formatting programs is that large files of technical documents on a given subject could be queried by computer for particular information or summarized with respect to particular categories without the necessity to code or alter the input natural-language documents.

The author stresses that these programs are not based upon semantic categories that are supplied beforehand by someone with knowledge of the given science. They are based on general properties of language structure and on the fact that words with similar informational standing in the science occur in similar positions vis a vis other words in the texts.

078a Sager, Naomi
THE STRING PARSER FOR SCIENTIFIC LITERATURE. In Randall Rustin, ed. Natural Language Processing. New York, Algorithmics Press, 1973, pages 61-87.

This paper describes the parsing program for analyzing scientific literature which has been operative since 1965. The current field of application is pharmacology. This paper deals primarily with the organization of the grammar and the type of analysis obtained.

078b Sager, Naomi
SUBLANGUAGE GRAMMARS IN SCIENCE INFORMATION PROCESSING. Journal of the American Society for Information Science, Vol. 26, No. 1, January-February 1975, pages 10-16.

This paper presents the results of an investigation into information structures in natural-language science texts. A novel hypothesis was tested, namely, that the literature of a science subfield has characteristic restrictions on language usage which can be used to develop information formats for text sentences in the subfield.

078c Sager, Naomi, et al.
TRANSFORMING MEDICAL RECORDS INTO A STRUCTURED DATA BASE. In D. Waltz, Natural Language Interface, ACM-SIGART Newsletter, No. 61, February 1977, pages 38-39.

A procedure used to transform medical records into a structured data base is described.

The first experiment in automatic information formatting reported in 1976 by the Linguistic String Project (LSP) at New York University involved the processing of a set of follow-up x-ray reports on patients who had had surgery for breast cancer.

To begin the experiment, manual linguistic analysis was performed on sample texts to provide an information format for that type of material. Once the medical narrative had been mapped into information formats, the data base could be used in a variety of ways. One of the uses currently under development concerns the extraction of various medical statistics from the x-ray data base (e.g., number of patients with recurrence of metastasis; location of new metastasis). A project of the Computer Science Department at the Courant Institute of Mathematical Sciences is preparing to use this data base to process questions and prepare responses.

The LSP is now working on a second experiment in formatting medical records. The natural language material for this experiment consists of hospital discharge summaries which consist of roughly 1-3 pages in length giving the background, reason for admission, physical examination, laboratory data, narrative of the course in the hospital, diagnosis, and discharge status of a patient's hospital stay.

The authors state that if this undertaking is successful, it should then be possible to perform a wide variety of medical information processing tasks without having to input the patient record in a special format.

079 Schlie, Theodore W.; Ruth M. Katz; Virginia Coyle
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Grant: DSI 76-01576
Date: January 13, 1976

SEMINAR ON INDUSTRIAL INFORMATION. Held in conjunction with

the 38th World Congress of the International Federation for Documentation, Mexican City, October 1-2, 1976, 48 pages.

Availability: Contact authors

On February 16-18, 1976, a conference on The Role of Scientific and Technical Information Services in the Transfer of Technology in Latin America was held in Washington, D.C. As part of that conference, the Seminar on Industrial Information focused on the use of information and the development of an information infrastructure in Latin American countries. The objective of the seminar was to develop specific, feasible, and practical ideas that could and should be provided to actively build up an information infrastructure, and to further identify how the United States and Latin American countries might implement those ideas.

In attempting to meet the objectives, the conference placed particular emphasis on distinguishing that kind of information which was relevant to or required for technology transfer from more generalized Scientific and Technical Information (STI), and understanding the experiences and perspectives of Latin American decision makers responsible for the management of STI.

The seminar subgroups felt that various education/training programs directed toward industrial information professional development in Latin America were the primary area in which information infrastructural development efforts should take place.

The need for development of local public and political support for industrial information activities in Latin America also seemed to pervade many decisions. A need for adequate local funding of any recommended initiatives was emphasized.

Many of the specific ideas put forward by the small subgroups included recommendations for surveys, inventories, directories, evaluations, analyses, compilations, and studies. The subgroups felt that, even when more surveys, directories, and evaluations have been carried out, there will be a need for a brokering or facilitating role to design and implement joint information efforts between the U.S. and Latin American countries.

The seminar participants concluded that, since specific ideas for actions related to the development of the information infrastructure in Latin America have been identified, there is a need for a follow-up and follow-through to alert relevant funding sources in North America and Latin America to the existence of these ideas, and to begin implementation wherever possible.

080 Sparks, Robert
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Grant: SIS 74-19279
Date: 1976

INSECTS OF HAWAII. Vol. 9. Microlepidoptera. Honolulu, University of Hawaii Press.

Availability: Contact publisher

This volume continues the study of the Hawaiian Lepidoptera from Volume 8 of this series.

About 1600 kinds of insects have been cited in the first eight volumes of Insects of Hawaii. Volume 9 discusses a portion of the remaining 4000 species. The discussion will continue in future volumes. The previously published volumes in this series are: (1) Introduction (Geology, Evolution, Distribution, etc.); (2) Apterygota and Thysanoptera; (3) Heteroptera; (4) Hemoptera; Auchenorhyncha; (5) Hemoptera Sternorehyncha; (6) Ephemeroptera-Trichoptera and Supplement to Volumes 1 to 5; (7) Macrolepidoptera; and (8) Lepidoptera: Pyraloidea. There remains to be completed volumes on the Coleoptera, Hymenoptera, and Diptera.

The major purpose of these volumes is to take stock of the known Hawaiian insects and to facilitate their identification. It has never been the intention to describe new species in these books, although large numbers of new species have been examined during the course of the writing. Had new species been described, few volumes could ever have been completed.

These volumes have been written to be used with Fauna Hawaiiensis and the Proceedings of the Hawaiian Entomological Society, and it is assumed that readers will have available those publications.

081 Summit, Roger K.; Oscar Firschein
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Grant: GN-42299
Date: September 1, 1976

AN INVESTIGATION OF THE PUBLIC LIBRARY SYSTEM AS A LINKING AGENT TO MAJOR SCIENTIFIC, EDUCATIONAL, SOCIAL, AND

ENVIRONMENTAL DATA BASES. TWO-YEAR INTERIM REPORT. 114 pages.

Availability: NTIS, PB 261 859

This experiment investigated the potential of the public library as a linking agent between the public and the many machine-readable data bases currently accessible through on-line terminals. Four public libraries in Northern California, members of the Cooperative Information Network (CIN), were the original participants in the study; four additional libraries in other parts of the country were introduced in the middle of the second year.

Several important areas were approached including the possible use of on-line searching to the patrons of a public library, the impact of such a system on both tne library and the patron, the requirements for successful use of an on-line reference service in the public library, and the financial and marketing aspects of such service. The investigation was conducted by Lockheed Information Systems and Lockheed also provided the DIALOG on-line search service. Evaluation was performed by Applied Communication Research, a nonprofit behavioral research firm in Palo Alto, California. The project was reviewed by an Oversight Committee of five experts in various specialties of public librarianship, marketing, and information science.

Some general conclusions are suggested by the evaluation data. The public library can be an effective channel through which to provide an on-line retrieval service, but librarians are not all equally well suited to provide such service. The allocation of reference-service staff time is one of the most important factors to be considered in planning an on-line search service. To maintain search proficiency, on-line searchers must complete some "critical mass" of searches each month in each data base for which proficiency is desired. Fee-for-service did not bring the problems that many librarians had feared; there is a segment of the public willing to pay for such search service, and fee collection is straightforward. The present interim report only describes the first 2 years of the experiment, the final report will be available in the fall of 1977.

Other publications:

081a Ahlgren, Alice E.
FACTORS AFFECTING THE ADOPTION OF ON-LINE SEARCH SERVICES BY THE PUBLIC LIBRARY. ASIS Midyear

Conference, Portland, OR, June 1975.

This paper focuses on fixed costs connected with system operation in the public library, individual search costs, and costs associated with the additional time demands made on the library reference staff. In addition, several factors are discussed which policymakers should take into consideration when deciding how to provide financial support for on-line search services.

081b Ahlgren, Alice E.
ON-LINE SEARCH SERVICES IN PUBLIC LIBRARY: PROJECT DIALIB. American Library Association Annual Conference, San Francisco, CA, July 3, 1975.

This paper reviews the DIALIB project and also describes a similar project being undertaken in New York City through the New York Metropolitan Reference and Research Agency (METRO).

081c Cooper, Michael D.
INPUT-OUTPUT RELATIONSHIPS IN ON-LINE BIBLIOGRAPHIC SEARCHING. Journal of the American Society for Information Science, Vol. 28, No. 3, May 1977, pages 153-160.

A methodology is proposed to aid in system design and evaluation of on-line bibliographic search systems.

In order for librarians to evaluate the relative advantages and disadvantages of an on-line versus a manual search, cost measures for on-line searching should be developed. In an earlier paper, the cost of providing an on-line search to a user was examined. The present study extends the cost analysis by developing statistical relationships between measures of output of a search and its input variables. For the purpose of this paper, output variables include the cost-effectiveness and the cost of the search. Input variables encompass factors such as the characteristics of the search itself (number of index terms, Boolean operators, etc.), characteristics of the requestor (age, sex, occupation, education, etc.), and characteristics of the searcher.

Multiple linear regression analysis is used to determine if there is a relationship between measures of search output and input.

Measures of cost-effectiveness and cost alone are presented and their values are calculated using empirical

data from the DIALOG system for a sample of searches. From the sample data it is concluded that the cost-effectiveness measures are not sensitive to input-variable changes. In contrast, there is a good statistical relationship between the cost of an on-line search and the value of the input variables. With more research, statistically sound cost-effectiveness equations might be developed. The author states that the possibility of performance prediction and design improvements through the use of search cost-effectiveness equations is an attractive possibility.

081d Cooper, Michael D.; Nancy A. DeWath.
THE COST OF ON-LINE BIBLIOGRAPHIC SEARCHING. Journal of Library Automation, Vol. 9, No. 3, September 1976, pages 195-209.

A cost analysis of 411 on-line bibliographic search requests was conducted. The study involved monitoring the time that 35 individuals in four public libraries spent processing these requests. The study identified a set of seven tasks that are performed for each request and determined the average time and cost for each of the tasks. The average total direct search cost was $28.41 exclusive of telephone line charges. This figure included the data base connect charges of $17.29. The average time to process a request was 7.8 calendar days. A wide variation in the cost and time figures was found among the four libraries.

081e Cooper, Michael D.; Nancy A. DeWath
THE EFFECT OF USER FEES ON THE COST OF ON-LINE SEARCHING IN LIBRARIES. Journal of Library Automation, Vol. 10, No. 4, December 1977, pages 304-318.

A comparative cost and time analysis of a library providing on-line searching services with or without a fee is presented. Four library search services were evaluated. The study indicated that when the service was free to the user, the cost to the library averaged $26.73. Shifts in library resources were found to have taken place, with the librarian spending relatively more time preparing for and subsequent to the search and less time at the terminal during the pay period than during the free period. Data base connect charges were found to have decreased by $5.75 and off-line print costs to have increased by $2.00 from the free to the pay period. A sharp 44% decrease in the time required to process a request occurred between periods.

The data presented in this paper do not strongly support the conclusion that libraries are more efficient in

providing on-line searching services when the user pays a fee, even though there is some previous statistical evidence to that effect. Total costs have come down since the institution of fees, and for the task that required reimbursement from the user there was a decline in costs. There is another aspect to the problem. The data support a view that there are fewer significant differences between the libraries in search costs during the pay period than the free period. This suggests that institution of a fee may have the effect of reducing the heterogeneity of the libraries' services, at least with respect to costs.

The efficiency with which a search is performed is not solely a function of cost. This study cannot say whether the searchers themselves were more or less efficient in one period or another, or in one library or another. The analysis is confined to the cost of the search. The larger question of cost-effectiveness needs to be determined.

081f Firschein, Oscar
ON-LINE REFERENCE SEARCHING. IEE Spectrum, Vol. 12, No. 10, October 1975, pages 68-71.

This article briefly and simply describes the use and feasibility of computerized retrieval for scientific researchers. Using the Lockheed DIALOG system, the author presents examples of search costs and the interactive communication between system and user.

081g Firschein, Oscar; Roger K. Summit
COMPUTERIZED RETRIEVAL IN A PUBLIC LIBRARY SETTING. COMPCON Spring 75 (Computer Technology to Reach the People). February 25-27, 1975, session 29, pages 299-302.

This paper is a review of a study of on-line reference retrieval for scientific researchers. It emphasizes the problems that arise in providing sophisticated, computer-based service to nontechnical users and the impact of the service on the public and on the library.

081h Firschein, Oscar; Roger K. Summit
ON-LINE REFERENCE RETRIEVAL IN THE PUBLIC LIBRARY: SOME LESSONS LEARNED. Proceedings of the 39th Annual Conference, Vol. 13, American Society for Information Science, 1976, page 40.

The authors present lessons learned during the first 2

years of on-line reference retrieval. The service attracted deeper questions than some of the libraries had been used to, and the unexpected amount of time for off-line research negotiation with the patron and search follow-up did cause hardships for several of the libraries. Other information gained concerning budget requirements, formulation of library policy, publicity within the library staff and to the general public, and training requirements is discussed in the paper.

081i Firschein, Oscar; Roger K. Summit
PROVIDING THE PUBLIC WITH ON-LINE ACCESS TO LARGE BIBLIOGRAPHIC DATA BASES. 2nd USA-Japan Computer Conference, Tokyo, Japan, August, 1975, 7 pages.

This paper reports the first year of research on providing the public with on-line access to bibliographic data bases and emphasizes the results gained thus far. It includes a list of data bases used in the study, tables giving search statistics and titles, and a brief description of an interactive exchange in the DIALOG system. Second year research plans are also presented.

081j Summit, Roger K.; Oscar Firschein
ON-LINE REFERENCE RETRIEVAL IN A PUBLIC LIBRARY. Special Libraries, Vol. 67, No. 2, February 1976, pages 91-96.

An experiment is described in which the public library is used as a linking agent between the public and computer-readable data bases. Retrieval terminals have been placed in four public libraries in northern California to provide access to 16 different data bases. The first year of this 2-year experiment is described, and some of the technical, organizational, and economic aspects of the study are reviewed.

082 Tou, Julius T., et al.
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Grant: SIS 75-00013
Date: June 1976

TELEBROWSING SYSTEM. Part 1. General Design Principles.

Availability: Contact authors

The first phase of work on the Telebrowsing System Project conducted at the Center for Information Research is presented. In this project, the researchers have designed an experimental minicomputer-based, telebrowsing, user-oriented system, with multilingual capability. The system is cost-effective. Based upon estimates, a commonly used minicomputer equipped with an 80 MW disc will be able to handle 250,000 documents. The report details the system design and the interactive, on-line information retrieval of science information and will investigate the feasibility, viability, and utility of the telebrowsing concept by use of remote, interactive CRT terminals.

The authors state that the introduction of telebrowsing to an information system will provide more useful and convenient services directly to the users--scientists, engineers, scholars, researchers, and administrators. The authors feel that telebrowsing is a step toward improving information systems that are needed to meet the challenge of a postindustrial society.

083 Wanger, Judith; Carlos A. Cuadra; Mary Fishburn
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Grant: SIS 74-03465 A01
Date: 1976

IMPACT OF ON-LINE RETRIEVAL SERVICES: A SURVEY OF USERS, 1974-1975. 297 pages.

Availability: NTIS, PB 268 591

An exploratory study of the users of the major on-line services is discussed. The purpose of the study was to describe the community of users to learn about the kinds of preferences that users were developing and users' problems and to assess the impact of on-line literature searching on users' operations.

SDC elicited the cooperation of nine other major suppliers of bibliographic on-line services to provide the broadest possible user and supplier base for exploration. Each of the participating suppliers was asked to help by either providing their user list or mailing the questionnaires directly to their users, and by reviewing questionnaires and/or the preliminary data and the draft of the final report. Letters requesting participation in the study were mailed to identified user organizations. Each

willing organizational unit received one Manager's Questionnaire and up to three Searcher's Questionnaires. None of the questionnaires posed queries about specific systems, since the purpose was to understand the general impact of on-line services, not to evaluate one system against another. The total number of respondents was 1273, representing 546 unique organizational units.

The authors conclude that on-line systems are highly regarded by those who use them and that, in spite of difficulties stemming from imperfect technology, on-line searching is growing in importance and usefulness. Many institutions using on-line services have modified their free-service philosophy to cope with the high demand for on-line service. Most of the current users are information intermediaries, but the number of scientists, business persons, and others who are doing their own searching is growing.

084 Whalen, Bruce G.
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Grant: DSI 76 SP-1002
Date: November 1976

SCIENTIFIC AND TECHNICAL INFORMATION: OPTIONS FOR NATIONAL ACTION. 68 pages.

Availability: NTIS, PB 261 863

In order to identify major scientific and technical information (STI) issues and action alternatives for the Office of Science and Technology Policy (OCTP), the Mitre Corporation was requested to undertake an analysis of the STI aspects of Public Law 94-282. Past reviews and studies were used as the basis for the analysis. Major concerns reflected in these documents were determined, and options for action were developed that OSTP could use to address national STI concerns.

Given the broad policy mandates of P.L. 94-181, and recognizing that the survey will not be completed for 2 years, OSTP must decide whether to initiate action in the STI area now or wait until the completion of the survey. Based on Mitre's review of past efforts, two categories of actions are suggested. New organizational mechanisms to deal with Federal as well as national STI concerns could be established, including a focal point to assume agency-wide control of STI activities within each agency engaged in

research and development, a Federal Agency Coordinating Group and an Information Policy Board. Because the need for further study of the STI area has been repeatedly expressed, OSTP could also initiate a service of activities dsigned to obtain more concrete data on the nation's STI enterprise and more contemporary information on key STI issues.

085 Williams, Martha E.; Scott E. Preece; Sandra H. Rouse
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Grant: SIS 74-18558
Date: 1976

DATA ELEMENT ANALYSIS AND USE OF A RELATIONAL DATA BASE STRUCTURE FOR MAPPING BIBLIOGRAPHIC AND NUMERIC DATA BASES. Presented at the National Bureau of Standards Second National Symposium on the Management of Data Elements in Information Processing, Gaithersburg, MD, October 24, 1975, 16 pages.

Availability: Proceedings of the conference

The feasibility of a data-base map for showing existing and potential relationships between bibliographic and chemical numeric data bases, and between data bases and conversion tables and conversion algorithms was studied. Relationships exist by virtue of commonality of data elements in various sources. In order to define elements and establish a set of tags for denoting the elements, a large number of data bases were analyzed and broken down into their component elements and microelements. The resulting set of microelements was used to build a common set of macroelements. A data element analysis was then necessary to define the element tags for establishing relationships between identical and similar element types that may be represented differently in different data bases.

The Data Base Mapping Model and Search Scheme (DBMMSS) has been implemented as a relational data base. The DBMMSS support software provides for flexible organization of and access to files of data and of interconnections among data. It provides a support tool for a program of research into the provision of guidance to the data-base user in making maximum use of multiple data bases of various types.

Since DBMMSS is to be used as primarily a research tool, secondary priority has been given to high efficiency, and highest priority has been given to providing maximum flexibility. The result, rather than a polished, user-oriented, information data base, is a noncentralized,

flexible, powerful tool for exploring the needs of the data-base user in identifying data resources and relating one to another according to his own definition of a problem.

Other publication:

085a Williams, Martha E.; Keith MacLaury
MAPPING OF CHEMICAL DATA BASES USING A RELATIONAL DATA BASE STRUCTURE. In Computers in Chemical Education and Research, eds. Eduardo V. Ludena; Nora H. Sabelli; Arnold C. Wahl. New York, Plenum Publishing, 1977.

The potential for automatic mapping or conversion of chemical data bases into a common format is investigated. The purpose of the chemical data base mapping work was to demonstrate the feasibility of using the results of one data base search as access points to search another data base. The work was restricted to the field of chemistry as a text case. Chemistry was selected because both the need for and potential for mapping are greater in chemistry than in other fields. It also provides a "worst case" situation because of the nomenclature problem.

In order to carry out the feasibility study, a number of steps were necessary. These included data acquisition, data analysis, designing a relational data base structure, data tagging, defining relations needed, designing and developing programs for extracting data, data entry, generation of maps, and evaluation and assessment.

The results obtained during the study indicate that the use of such mappings greatly increases the potential for accessing data bases, particularly for the user who wants specific data from a given data base but does not know what system of nomenclature is used in the desired data base.

The authors state that there are two major ways in which a data base mapping scheme could be developed--as an on-line directory only, or as a directory plus a linking mechanism in a distributed data-base network. In either case, a directory capability would be required and the data base about the data base would have to include additional information about each file. Other necessities for a functional chemical data base mapping scheme are itemized.

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Date: December 1976

MANAGERS, PROFESSIONALS AND STI. 11 pages.

Availability: Contact author

An analysis of managers' influence on their staffs' use of scientific and technical information (STI) is presented.

The definition of STI for the purpose of this survey is limited exclusively to information originating outside the firm in question.

Firms which are both high- and low-level users of STI in the pharmaceutical and electronic system industries were located and managers and professionals interviewed. From these interviews, the author concluded that managers do have an influence on the use of STI and they do believe this influence is worthwhile.

The study suggests that managers have an ability to locate valuable STI which is not available to professionals in their normal activities to maintain professional competence. Managers appear to give only ad hoc attention to their influence n STI dissemination.

The author found that first-line supervisors encourage the use of available STI. He also found that, if top management provides STI and accepts work which accesses to STI, then the STI will be used and will be valuable.

The key to managerial support for STI is the manager's own experience as a professional. If managers have had positive experiences in their own practice, they will see that STI is available to others once they become managers.

The most important way in which managers influence the use of STI is in routing documents, announcements, and references to their staffs. They will do this only if they believe their professionals would not encounter the STI in the normal practices of keeping up to date, and they may easily grasp the relevance of the source. The author states that these concepts should be considered in the design of STI services.

The analysis suggests that it may be useful for firms to conduct periodic training sessions on the STI needs of the firm, STI services available in the firm and their value to date, and lessons and examples on the role of the manager in the use of STI.

Results also suggest that research is needed to provide guidelines for managers in at least the following areas: the management of visits, e.g., preparation, control over proprietary information, number and type of useful visit, maintenance of contact files; and the management of specifying information sources, e.g., selection of sources likely to be of use to managers, yet not likely to suggest weakness in their own ability to keep up in STI.

087 Zunde, Pranas
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Grant: GN-36114
Date: June 1976

SCIENTIFIC AND TECHNICAL INFORMATION TRANSFER FOR EDUCATION (STITE). FINAL REPORT. 137 pages.

Availability: ERIC, ED 128 012

The main objective of the Scientific and Technical Information Transfer for Education (STITE) project was to study man-machine mechanisms for enhancing the transfer of science information from its present repositories into science learning systems. More specifically, the research was performed to describe outputs for integration into learning systems; to compare science information systems and science learning systems, particularly from the viewpoint of transferring information through a man-machine interface; and to implement an experimental design of an interface system and a limited transfer mechanism.

In the course of this research, the above goals were successfully implemented. In particular, selected scientific and technical information systems were analyzed, and information needs of science educators were thoroughly studied. Subsequently, an experimental interface mechanism was developed which helped to structure educational tasks so the educator could make better use of existing information resources. The idea of the interface system was to store certain amounts of information which is in highly structured, modular form relevant to specific needs of various groups of educators. The essential feature of such a modular interface system is the interaction between the stored internal information about the subject matter and the external information from the information repository.

Other publications:

087a Zunde, Pranas, et al.
SCIENTIFIC AND TECHNICAL INFORMATION TRANSFER FOR EDUCATION (STITE). RESEARCH REPORT NO. 1. July 1973. 169 pages.

Availability: ERIC, ED 095 867

087b Zunde, Pranas, et al.
SCIENTIFIC AND TECHNICAL INFORMATION TRANSFER FOR EDUCATION (STITE). RESEARCH REPORT NO. 2. December 1973. 73 pages.

Availability: ERIC, ED 095 868

087c Zunde, Pranas, et al.
SCIENTIFIC AND TECHNICAL INFORMATION TRANSFER FOR EDUCATION (STITE). RESEARCH REPORT NO. 3. June 1974. 102 pages.

Availability: ERIC, ED 095 869

087d Zunde, Pranas, et al.
SCIENTIFIC AND TECHNICAL INFORMATION TRANSFER FOR EDUCATION (STITE). RESEARCH REPORT NO. 4. June 1975. 159 pages.

Availability: ERIC, ED 110 016

088 Baumol, William J., et al.
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Grant: SIS 74-12785
Date: April 1977

MANUAL OF PRICING AND COST DETERMINATION FOR ORGANIZATIONS ENGAGED IN DISSEMINATION OF KNOWLEDGE. 137 pages.

Availability: Contact author

A manual of pricing and cost determination for publishers of scientific and technical journals is presented. The authors present cost and revenue principles. Some principles and some research procedures which could be helpful to publishing organizations when they make funding/cost decisions are described. The manual describes step by step how a publisher can apply these principles and procedures in practice.

The authors discuss cases in which the reorganization of publication arrangements could permit monetary savings in the supply operation of scientific and technical journals. Some principles of pricing designed to increase publication revenues, while not disregarding either ability to pay or the desirability of stimulating the circulation of the journals, are described.

Shortcomings of full-cost pricing, price discrimination, and modification of a flat price to increase net return are discussed.

Consolidation of journal subscriptions as a means of increasing publishers' revenues and multipart pricing arrangements are investigated. The economics of various aspects are discussed.

Other publications:

088a Baumol, William J.
ON THE PROPER COST TESTS FOR NATURAL MONOPOLY IN A MULTIPRODUCT INDUSTRY. The American Economic Review,

Vol. 67, No. 5, December 1977, pages 809-822.

Cost tests for a natural monopoly in a multiproduct industry are investigated. An analysis of a single-product firm makes it harder to prove that a particular monopoly is natural, even in the single-product case. Subadditive cost functions and their relation to more conventional concepts such as declining average costs are characterized.

When the multiproduct case is investigated, it is found that sufficient conditions for subadditivity must include some sort of complementarity in the production of the different outputs of the industry.

The discussion proceeds on the assumptions that the selection of available techniques is fixed (no technological change), that exactly the same choice of techniques is available to the monopolist and to each of its potential competitors, and that all input prices are fixed.

An unexpected finding of this investigation is that scale economies are neither necessary nor sufficient for a monopoly to be the least costly form of productive organization. Rather, the critical concept is (by definition) strict subadditivity of the cost function, meaning that the cost of the sum of any "m" output vectors is less than the sum of the costs of producing them separately.

088b Baumol, William J.; Elizabeth E. Bailey; Robert D. Willig
WEAK INVISIBLE HAND THEOREMS ON THE SUSTAINABILITY OF MULTIPRODUCT NATURAL MONOPOLY. The American Economic Review, Vol. 67, No. 3, June 1977, pages 350-365.

The conditions under which a "natural monopoly" can find a set of prices and a set of products that are sustainable against competitive entry are investigated. By a natural monopoly the authors mean an industry whose cost function over some given set of products is such that no combination of several firms can produce an industry output vector as cheaply as it can be provided by a single supplier. A sustainable vector is a stationary equilibrium set of product quantities and prices which does not attract rivals into the industry. Even if a vector is not sustainable, a monopoly may still be able to protect itself from entry by changing its prices whenever and however necessary in response to any entry that threatens at that moment. But, by definition, only a sustainable vector can prevent entry and yet remain stationary.

Ramsey's rule for Pareto optimal pricing under a budget constraint is discussed.

Four theorems are investigated with respect to natural monopolies and the authors show that, even under monopoly, the threat of entry can impart some power to the invisible hand. For example, if the monopoly industry has a cost function which exhibits sufficiently strong cost advantages, the invisible hand can be shown to encourage a firm to adopt Ramsey prices for its marketed goods, satisfying the relative price conditions for whatever profit level the barriers to entry permit the monopolist to earn. An issue which seems not to have been discussed before in the Ramsey literature is that this sustainable solution involves production by the monopolist of the Ramsey-optimal set of goods and services. The authors show that only this price-output vector can guarantee, independent of any but local knowledge of its demand, conditions to protect the firm against competitive entry.

The authors feel that the discussion also might have one fairly direct implication for public policy. It is suggested that the public interest is served by encouraging a monopolist to price in anticipation of entry, rather than in response to it. That is, the monopolist should be encouraged to set prices and outputs that are socially desirable in the first place, rather than changing his prices case by case every time entry seems imminent or actually takes place.

088c Baumol, William J.; Yale M. Braunstein
EMPIRICAL STUDY OF SCALE ECONOMIES AND PRODUCTION COMPLEMENTARITY: THE CASE OF JOURNAL PUBLICATION. Journal of Political Economy, Vol. 85, No. 5, pages 1037-1048.

An empirical study applying the theory of scale economies and interproduct complementarity is presented. Several recently formulated concepts of the theory of scale economies are examined with the aid of cost-function estimates. Data for publishers of scientific journals were used. In one case the observations are shown to fall near the outer limits of the range of declining costs, implying that neither amalgamation nor breakup of firms will reduce total cost. In another case the observations fall well within the subadditive range, implying that amalgamation can provide savings. The study confirms the applicability of the new theory of scale economies to empirical investigation.

088d Baumol, William J; Janusz A. Ordover

ON THE OPTIMALITY OF PUBLIC-GOODS PRICING WITH EXCLUSION DEVICES. International Review for Social Sciences, Vol. 30, No. 1, pages 5-21.

Optimal pricing with exclusion devices for consumers of a pure public-good is examined.

Contrary to standard welfare analysis, the authors show that the Pareto-Optimal price of a public good is usually not zero, though, by definition, the marginal cost of additional users is zero. Since society must somehow pay the total cost of a public good, its Paretian price must satisfy Ramsey's theorem on optimal pricing under a budget constraint. A zero price for a public good may be further from the optimum than that of a profit-maximizing monopolist, or a nonprofit organization pricing to cover its costs. Several pricing models for nonprofit organizations (such as professional societies) are offered. These include models or organizations whose objective functions are to maximize the welfare of their members or to maximize the sales of their services (e.g., number of subscribers to their journals) or to maximize the number of members. It is shown that none of the models will generally produce Pareto-Optimal results.

The results of the discussion are that quasi-optimality in the supply of quasi-public goods (i.e., public goods for which exclusion is possible) is in general not guaranteed by any of the forms of distribution described--supply by private enterprise, by nonprofit organizations pursuing a variety of different objectives, or by a public organization that distributes the services at the zero price usually recommended for public goods.

The authors state that there seems to be little welfare-theoretic ground favoring the one form of distribution over the others. They suggest that policy makers should examine in each instance the extent of welfare loss as a result of each distribution method. The examination should then be used to determine whether public intervention and financing is appropriate.

088e Braunstein, Yale M., et al.
ECONOMICS OF PROPERTY RIGHTS AS APPLIED TO COMPUTER SOFTWARE AND DATA BASES. Prepared for the National Commission on New Technological Uses (CONTU) of Copyrighted Works. May 1977, 81 pages.

Availability: Contact author

The economics of property rights (copyrights) as applied to computer software and data bases is investigated.

Two issues, one general and one specific, are discussed. Generally, the authors investigate whether economic analysis can provide insights into the proper scope of copyright coverage for works stored in or used with the assistance of computers or other automated data processing systems. Specifically the authors discuss whether computer software should be copyrightable and, if so, what the terms of that copyright should be.

An analysis is presented showing how the economics of user fees for the copyright material influences the structure of the market for those materials. Economic theory is then used to show that in such a market there is an optimal structure of prices. The theory leads to the duplication that fees for the use of copyrighted material should be charged for as many of the uses as possible.

One possible exception to the general rule that charges should be levied in every market arises when the costs of collection of user fees are likely to be so high relative to the sums involved as to render that collection uneconomical.

The two prime methods available for the protection of computer software--copyright and trade secrecy--have opposite effects on usage. Copyright promotes disclosure, and reliance on the trade secrecy statutes requires suppression of information on software design advances. The authors analyze these effects and infer that the use of copyright for protection will have beneficial effects on the quality and variety of software.

Empirical evidence is presented which implies that, for the encouragement of the development of truly innovative software and fundamental breakthroughs in software design, public support of research institutions will continue to be needed even if copyright protection is provided.

The authors conclude that encouragement of software design, whether through copyright protection or by other means, is important as an element in the stimulation of economic growth.

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Date: February 1977

A STUDY OF COVERAGE OVERLAP AMONG FOURTEEN MAJOR SCIENCE AND TECHNOLOGY ABSTRACTING AND INDEXING SERVICES.

Availability: NFAIS (NFAIS 77/1); NTIS, PB 264 559

In October 1974, the National Federation of Abstracting and Indexing Services began a study designed to examine the amount of journal article coverage overlap among 14 major science and technology abstracting and indexing (A & I) services. Since journals frequently cover many subjects and contain interdisciplinary articles, overlap among lists of journals scanned by A & I services logically must occur. Overlap of journals, however, does not necessarily indicate duplicate coverage of the same article. Even when two or more services cover the same article, this does not imply unnecessary duplication since several services may select the same article but may be intellectually analyzed differently to serve the needs of different users. This study was undertaken to provide some hard data on the question of the actual extent of journal article overlap. Once data becomes available, a possible outcome may be that services can begin working toward cooperative programs.

The scope of the study is bounded by the type of literature studied (journal literature) and the time period (18 months). Fourteen major scientific and technical A & I services were included in the study. Of the approximately 26,000 1973 journal articles scanned by at least one service, 5,466 had been indexed or abstracted by two or more services. From a sample set of citations, an overall article overlap of 23.4% was calculated. This overlap is only relevant to the 5,466 citations; the remainder of the 26,000 have no article overlap.

Percentages of overlap for the 14 individual services reflecting the fraction of all 1973 articles which were indexed by at least two services were also computed. Altogether nine articles were found to be abstracted and/or indexed by seven services; no articles were indexed by more than seven.

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Grant: SIS 75-16262
Date: January 31, 1977

ENHANCING THE RETRIEVAL EFFECTIVENESS OF LARGE INFORMATION SYSTEMS. FINAL REPORT. 157 pages.

Availability: NTIS, PB 266 008

The authors describe their attempt to enhance the

efficiency of searching large, machine-readable data bases. The research is directed toward improving the recall and precision characteristics of retrievals initiated by user requests as well as helping the user form concepts. For the latter, methods are sought which transfer to the computer some of the tasks that are normally performed by the user. Such developments are motivated by the rapid growth in the volume of on-line information retrieval (IR) activities and the fact that the cost of searches is limited not by cpu search costs but by labor costs and input/output costs. For a typical search, costing between $100 and $300, usually less than $5.00 in cpu is consumed. Such costs suggest that large efficiency gains can be made by further automating IR systems functions.

There are two underlying issues. The first is the relationship between statistical string processing and semantic word processing. The second is the concept of multistep processing of a search request. Multistep processing of large files involves using more than one methodology in distinct steps to process a single search request. The steps are arranged so that the first process is most appropriate for use on the file as a whole. The second step then operates on the subfile identified by the first step and further refines the output file. In this study, the multistep search idea was tested at length, using Boolean search as the first step and subject term clustering as the second.

The results of the study in multistep searching were encouraging. Moreover, it was found that processing may be further strengthened by incorporating some semantic information into statistical string processing by the use of the new method, Automatic Term Classification. Overall, the results suggest an organization for the IR system of the future in which several processing techniques are used during a single retrieval and in which the system will be an active search partner.

Other publications:

090a Llewellen, Patricia A.; Ronald M. Kaminecki COMPARISON OF SYSTEM DEVELOPMENT CORPORATION AND LOCKHEED SYSTEMS IN SEARCHING CA CONDENSATES AND NTIS DATA BASES ON-LINE. Special Libraries Association Annual Conference. Chicago, IL, June 1975.

The intent of the presentation was to show how a search center, such as the IITRI Computer Search Center (CSC)

selects the bibliographic service to be used for specific search tasks, and what system characteristics lead to this selection. These characteristics include availability of data bases, cost, and promptness of output mailings. The presentation emphasizes that it is a case study, applicable in detail only to CSC, but generally helpful to information specialists choosing data bases for particular search requests.

090b Schipma, Peter B.
GENERATION AND USES OF MACHINE-READABLE DATA BASES.
In Carlos A. Cuadra, ed., Annual Review of Information Science and Technology, Vol. 10, American Society for Information Science, 1975, Chap. 7, pages 237-271.

This chapter continues the coverage of the generation and use of machine-readable data bases inaugurated in Volume 9. It is therefore an update consisting primarily of 1974 material. Herein, data base is considered to be an organized collection of machine-readable records containing bibliographic and/or document-related data (e.g., index information). The data bases considered are used for information storage and retrieval and/or for research in information storage and retrieval or data base generation. The chapter concentrates on evaluation studies, whether they be in terms of costs, algorithm performance, on-line versus batch systems, or user satisfaction.

091 Caruso, Dorothy Elaine
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Grant: DSI 76-09538
Date: December 1977

TRAINING MODULES FOR USE OF SCIENTIFIC AND TECHNICAL INFORMATION SERVICES. REPORT OF WORK COMPLETED. 133 pages.

Availability: Contact author

The design, development, and evaluation of training materials which would enable users of scientific and technical information (STI) to identify appropriate machine-readable data bases and to access those files with available search systems is discussed.

The results of the research are presented in four sections. The first section contains a training manual and a

series of practice question types exemplifying particular search-system characteristics and data-base attributes. A series of online training and practice modules coordinated with the printed materials is presented in the second section. Simulations of two commercially available search services (DIALOG-TM and ORBIT-TM) and a data base of over 60 machine-readable files are in the third and fourth sections respectively.

The author states that the values of the modules lie in three areas: the careful selection of the capabilities taught; the capacity of the training materials to incorporate new or revised content; and the adaptability of the materials for use with or without computer facilities or access to the target systems and with trainee populations of varying abilities.

The textual materials can be used as they are, with local or remote access to the emulators or to the target systems. The emulators can be accessed remotely or brought up on any computer system supporting ANSI FORTRAN. The computer assisted learning-sequences can be accessed remotely or implemented on a system which maintains a capable lesson designer-type language.

Other publications:

091a Caruso, Dorothy Elaine
TRAINING AND RETRAINING OF LIBRARIANS AND USERS. Presented at the Pittsburgh Conference on the On-Line Revolution in Libraries, Pittsburgh, PA, November 14-16, 1977. (Conference proceedings to be published by Marcel Dekker, 1978.)

The variations in approaches to information searching are investigated. Limitations set by physical systems, data-base differences, and user needs are discussed. The value of commercial information services is considered. Custom-tailored programs, more general bibliographic data bases, and specially tailored services with more general capabilities are described.

The understanding of the content and structure of the various data bases is generally considered to be a problem. Users need to know about variations in files produced by search systems. Training activities which can familiarize the user with the variations are outlined.

The values of user vs. trained intermediary searching are compared. The author states that training the user is a

more demanding task than training the professional information specialist. The training program entitled Training Modules for Scientific and Technical Information Services being developed at the University of Pittsburgh is outlined and suggested as possible solution for adequate user training.

091b Caruso, Dorothy Elaine
HANDS ON ON-LINE. BRINGING IT HOME. October 1977 (revised January 1978).

Availability: Contact author

A manual for the would-be user of computer retrieval services and magnetic data bases is presented. The problems a would-be user faces in accessing the contents of machine-stored bibliographic data bases are assessed. Presently available training is summarized and evaluated. Ways of improving training are suggested.

A new training program is presented which delivers the training to the home terminal of the trainee. The Hands-On On-Line Multi-System Multi-Data Base Trainer (Trainer), which provides emulations of bibliographic retrieval systems, is described. The Trainer accepts commands, searches files, and provides messages and displays which mimic operational services. Using the Trainer, the user trainee can develop the same skills he would learn in the "real" system. Trainer also has optionally available practice and instructional modules which guide the user in protocols of telecommunication services, computer login, file selection, search term negotiation, logical statement structure, interpretation of system messages and displays, and formatting of output from the search. These modules can be used as needed with either the emulators or the online system itself.

The use and availability of the Trainer outside the University is a design goal. Present experience with Trainer, use of system, and future developments are discussed.

091c Caruso, Dorothy Elaine
TRAINING (END) USERS OF ON-LINE SERVICES. Accepted October 1977 for publication in On-Line Review.

091d Caruso, Dorothy Elaine; John Griffiths
A TRAINER FOR ONLINE SYSTEMS. Online, Vol. 1, No. 1,

October 1977, pages 28-34.

The Trainer, a specially prepared system of programs which emulate, or behave like, large-scale systems, is described. The Trainer instructs and guides practice for the several aspects of on-line operations. Trainer was developed to enable people to learn the mechanics of accessing and operating search systems in a self-paced, economical, interactive environment.

Modules described in the paper include instruction in terminal telecommunications protocols, and guided logging practice, identification, and access procedures.

The Trainer is a guide to the complexity, flexibility, and similarity of online search systems.

When using the practice features of Trainer, the trainee is free to access a number of different database files. The three presently available are: Paper Chemistry, NTIS, and GEOREF. Each practice file consists of one representative issue of the title, or of an issue-sized sample of the title. A file currently consists of 50-500 citations. As Trainer is developed, more systems are included.

Trainer is capable of supporting as many files as the commercial services. The system includes support programs for file index building and directory updating.

Examples of DIALOG and ORBIT emulations are included.

092 Chandler, John S.; Thomas G. DeLutis
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Grant: SIS 75-21648
Date: June 1977

A METHODOLOGY FOR MULTI-CRITERIA INFORMATION SYSTEM DESIGN. 31 pages.

Availability: Ohio State University OSU-CISRC-TR-77-14

The methodology described in this paper establishes a technique which can both evaluate user goals as a function of system behavior and analyze system-resource performance as a function of user demand. Current evaluation technologies focus on only one criterion in the system design, either the user's or system's resource performance.

The methodology described is iterative, and is comprised of three separate but integrated stages. The first stage models and evaluates system behavior. The second stage evaluates the user-based criteria and provides evaluative insight into performance improvement. Finally, the third stage heuristically determines the current model's acceptability and need for modifications.

The evaluative procedures developed for this methodology have been shown to be valid in practice by the authors. The methodology suggests a basis for continued research into areas such as: investigation into the causal relationships between user demand and system activity, sensitivity analysis of these relationships, investigation into suitable heuristics for Stage 3, and development of heuristic/modification rules to close the design loop into an automatic self-modifying process.

093 Chemical Abstracts Service
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Contract: NSF-C656
Date: September 1977

PROGRESS IN THE CHEMICAL INFORMATION SYSTEM PROGRAM-III: ON-GOING COMPUTER-BASED TECHNIQUE FOR INPUT AND OUTPUT OF CHEMICAL INFORMATION. FINAL REPORT ON NSF-C656. 61 pages.

Availability: NTIS, PB 273 998

The Chemical Abstracts Service's (CAS) progress in developing a computer-based system for processing a full range of information publications and services is described. The efforts focus on the development of on-line, interactive techniques for automated input and edit of CAS information data. On-line input of structure diagrams appearing in Chemical Abstracts (CA) issues using a cathode-ray-tube terminal is discussed as are on-line review and editing of textual information. Included in this work are computer-based techniques for generating chemical substance nomenclature and for standardizing nonsubstance vocabulary. Automated structure-display techniques include an algorithm which generates a structure diagram for internal CAS use and an interactive graphics system for publications-quality structure diagrams. Existing photocomposition techniques permit nearly 100% of textual information published by CAS to be photocomposed. Portions of this work were supported by the National Science Foundation, and other parts were supported entirely by CAS.

094 Collons, Rodger D.; Donald W. Jarrell;
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Grant: DSI 76-19623
Date: September 1977

INCENTIVES FOR THE GENERATION, DISSEMINATION AND USE OF SCIENTIFIC AND TECHNICAL INFORMATION. 120 pages.

Availability: NTIS, PB 276 180

A summary of a day and a half conference held in Philadelphia on March 10-11, 1977 to identify incentives for the generation, dissemination, and use of scientific and technical information is presented. Attended by 37 participants, the conference brought together key decision makers and specialists in scientific and technical information systems and specialists from incentives areas applicable to scientific and technical information systems.

Although the issue of incentives was too complex to permit the development of a set of incentives particularly applicable to information systems, important insights resulted from the conference. The most outstanding of these to the author was that different incentives are applicable under different conditions. Equally important was the realization that scientific and technical information systems are embodied in complex sociotechnical organizations. Incentives have both primary and secondary consequences on the outcome sought and on the organization itself.

They suggest that there appears to be a great need in information services to be self-sufficient. They conclude that the educational system is the starting point for the introduction of incentives which promote good information usage practices. The participants felt that the effects of incentives cannot be determined in the abstract, that they must be reduced to practice and their effects observed. They felt that supplements to copyright laws need to be developed to expand dissemination where important social interests are involved.

Several ideas were projected by the incentive experts. They include the suggestion that organizations should honestly check to see if they have negative or positive incentive systems functioning for creative, productive people. Secondly, the widest possible utilization of technology is not necessarily served by legal enthusiasm for perfect communication. In addition, the incentive experts felt that more attention must be placed upon design skills

if the rate of application of new knowledge is to be increased.

They state that effective use of information requires a broad concept of problem solving which includes interrelated functions such as problem diagnosis, transmission of needs, generation of solutions, transmission, and application of solutions, all operating in a repetitive cycle. Unless mechanisms exist for each of these functions, effective use of information will be hindered.

Pricing techniques available for use as incentives are discussed by the incentive experts. These include price discrimination, pricing based upon contribution to cost, and bundling.

095 Committee on International Scientific and Technical Information Programs
Commission on International Relations
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Grant: DSI 74-12167
Date: June 1977

EVALUATION OF THE COMMITTEE ON DATA FOR SCIENCE AND TECHNOLOGY (CODATA) OF THE INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS (ICSU). 12 pages plus attachments.

Availability: Contact CISTIP or NAS

At the request of the National Science Foundation, the Committee on International Scientific and Technical Information Programs (CISTIP) has conducted evaluations of international organizations concerned with scientific and technical information transfer. This report comments on the information presented at a CISTIP-CODATA meeting on Oct. 19 and 20, 1976, and states conclusions and recommendations reached by CISTIP. The CISTIP evaluations are intended to investigate the organizations' effectiveness in such matters as: access to information generated abroad of value to U.S. communities; availability of U.S.-generated information and systems to communities outside the United States; means to enhance the capabilities of practitioners in all countries through international cooperation; and means to enhance the value and availability of information, with particular emphasis on its effective use by the less-developed nations.

In view of its findings, CISTIP recommends that the U.S. National Committee for CODATA seek to correct the present reliance on the United States for chairmanship

assignments and to continue its efforts to achieve a more equitable allocation of dues among CODATA members. CODATA should strengthen its organizational ties with specialists in the biosciences and geosciences and develop more projects in the nonnumeric and time/place dependent data areas. CISTIP's overall evaluation of CODATA is favorable. In its 10-year history, CODATA has established itself as the international leader in stimulating and developing methods for the collection, validation, publication, and use of data in the "core sciences" to which it has initially devoted itself, i.e., physics and chemistry. Its publication of data in these fields commands international acceptance and respect. It has stimulated the support of national data activities in other countries and facilitated the formation of new bilateral activities in the exchange of data from which the United States has benefited. If these were its only accomplishments, CODATA would be worth the present levels of personnel and financial support devoted to it by the United States.

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Grant: GN-36622
Date: March 1977

A METHODOLOGY FOR THE PERFORMANCE EVALUATION OF INFORMATION PROCESSING SYSTEMS. 183 pages.

Availability: NTIS, PB 266 943

The object of this research was the development of a methodology for evaluating the performance of computer-based science information processing systems. The goal was to create a facility for conducting research in objective and anticipated system architectures. The outgrowth of the research was a systematic approach to the characterization of information processing systems from a performance perspective and the construction of a discrete-event simulation system based on the methodology. The latter has been named IPSS, an acronym for Information Processing System Simulator.

The document describes the methodology and presents salient features of IPSS which enhance modeling and evaluation capabilities relative to complex, computer-based systems. The methodology divides the elements of an information processing system into three categories according to the function they serve: a data base, a service

which accesses the data base, and support facilities. A system is viewed as a hierarchy of services and data bases with each level supporting the service and data needs of the next higher level and requesting support from the adjacent lower level. The methodology emphasizes data-base access activity and identifies those system elements at each data-base level which contribute to this activity. Within IPSS, the characterization of the system elements has been formulated in such a manner that their interaction during model evaluation automatically produces the desired performance measures.

The IPSS is the realization of a methodology developed for investigating the behavior of complex, computer-based information systems and has been designed to serve their distinct users--the researcher, the information system analyst/designer, and the student. Its subsystems are the Translator, Built-in-Facilities, Library and Associated Access and Management Facilities, and Run-Control Software needed for the IBM S/370 Operating System--IPSS interface.

097 Dunn, Donald A.
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Grant: MCS 73-07973 A04
Date: July 1977

ECONOMICS OF COMPUTER COMMUNICATION NETWORKS (Ninth semiannual Report). Report No. 3. 37 pages.

Availability: Contact author

Activities associated with a grant entitled Economics of Computer Communication Networks during the period from 12/1/76 to 6/30/77 are described.

The objective of this grant is to develop a comprehensive and systematic picture of the economic aspects of computer communication networks in a form that will be useful to policy makers. This grant is in its fifth year, and a summary of the results of seven research projects completed during this period is presented.

The investigator for the project, Market for Computing Services in a Computer Network, studies the behavior of buyers and sellers of computing services in a market created by a computer network which interconnects the buyers and sellers.

In the project, Product Differentiation in Information Services, the authors assume that the services offered by different centers are indeed differentiated, as seen by the users. The differentiation is translated into an interdependence of demands for these services. Those investigating the project, Risk in the Information Service Market, study the high uncertainty which characterizes information services. Those associated with the project, Non-market Resource Allocation in Information Service Systems, are developing a model for allocating information files required in common by several computers. This model considers storage cost, transmission cost, file length, and request rates as well as updating rates of files, the storage capacity, and the "urgency" of each class of users. In the project, Packet-switched Network Technology-cost Studies, the investigators continued to study the fundamental capabilities needed from the subnet to support the design of efficiently distributed computing environments. The project, User Benefits from Computer-based Information Services, is intended to assess the benefits, provide an estimate of value of various information services with a view to predicting their prospects for expansion, and assist in policy formulation. Two papers were written and published by those working on the Information Sector of the Economy project.

098 Emery, James C., et al.
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Grant: DCR 75-03634
Date: April 1977

A SIMULATION MODEL OF A NATIONAL NETWORK FOR EDUCATION AND RESEARCH. Proceedings, 15th Annual AEDS Convention, Fort Worth, Texas, April, 25-29, 1977, pages 156-160.

Availability: Contact authors

A computer simulation model, developed to investigate behavioral aspects of a computer network connecting educational and research computer facilities, is described. The design of the model and issues to be studied using the model are discussed.

Primary issues to be assessed by the simulation model are those into which existing experience provides little insight. Changes which a network would bring to instruction, research, science information, or administrative computing, would be of concern to an educational or research institution. The impact the network would have on ingoing

and outgoing payments and established institutional policies would be important issues. Changes which would take place in the types of computing resources developed or maintained by an institution would be of interest to the institution. A final issue to be assessed is the effect on users of the availability of multiple resources at a variety of prices.

For design purposes, the model network has been defined as having 20 initial sites. Eighteen of these have been reserved for detailed representations of the 18 institutions participating in the project. The two remaining facilities are used to represent work to and from locations other than the 18 member sites and to experiment with various network-level service offerings. The model operates with a basic time unit of 1 week. Initial experimental results indicate several trends, but definite conclusions are difficult to draw. Further research is to be done on the project.

Other publications:

098a Nielsen, Norman R.; Ronald Segal
SIMULATION OF INSTITUTIONAL BEHAVIOR IN A NATIONAL NETWORKING ENVIRONMENT. Proceedings of 1976 Winter Simulation Conference, Gaithersburg, MD, December 6-8, 1976.

The design goals and operational characteristics of a computer simulation model which would permit investigation of the behavioral rather than the technical aspects of a national computer network are described.

Data for the study is being provided by 18 participating institutions around the country, permitting a realistic representation of the variety of capabilities, requirements, policies, and decision rules that exist at such institutions.

Using the simulation model, 11 areas of investigation pertaining to network performance and behavior have been identified. Five of these topic areas (standard performance, site specialization, network stability, network resource-sharing potential, and service pricing policies) behavior and impact and have been the subject of a pilot program of experimentation. The organization of these preliminary investigations and the experimental findings obtained to data are discussed.

The experiments performed thus far are of a preliminary nature. Conclusions cannot yet be reached, but several

trends have been observed. The network and institutional arrangements investigated thus far indicate that equilibrium network behavior tends to be quite stable. The networks examined also revealed a substantial resource sharing potential.

098b Segal, Ronald; Norman White
MANAGEMENT OF A LARGE COMPUTER NETWORK SIMULATION PROJECT. Proceedings of the Symposium on the Simulation of Computer Systems IV, Boulder, CO, August 10-12, 1976, 8 pages.

The management of a large-scale simulation of the behavioral aspects of a possible computer network which would connect the computer systems of educational and research institutions is described. The management team's experience with new advances in programming technology and design methodology is reviewed. The techniques evaluated include structured programming, top-down design, automatic documentation, a system development library, and structured walkthrough.

Adaptations of the techniques which were made for the simulation are discussed.

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Contract: C 76-05503
Date: January 28, 1977

REAL-TIME ASSOCIATIVE PROCESSING OF REMOTE-DATA BROADCASTS FROM FULL-TEXT FILES. 140 pages.

Availability: NTIS, PB 270 552

Research activity directed toward evaluation of the technological and economic potential of associative processing and mass storage devices in information retrieval from full-text bibliographic data bases, particularly for shared-resource networks, is presented. A model of a shared-resource network is given which appears to solve many of the existing problems that have inhibited the use of full-text files in the retrieval context. The network design offers practical solutions for coping with increasing file sizes.

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204 East Washington Street
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Grant: DSI 76-05499
Date: May 1977

THE ROLE OF SCIENTIFIC AND TECHNICAL INFORMATION IN CRITICAL PERIOD MANAGEMENT. VOL. 1 & 2. 135 pages.

Availability: NTIS, PB 272 178

The purpose of this study was to examine the role of scientific and technical information (STI) in the resolution of crisis situations. The study was designed to be an exploratory effort, one which would provide insight into the use of STI and develop hypotheses which could be employed in future experiments or analysis.

The method used to conduct the studies included the preparation and analysis of four ex post case histories of domestic crises. The crises examined include Penn Central bankruptcy; the Oil Embargo of 1973-74; the emergency blackout of September 20, 1970 in parts of New York City; and the Apollo 13 incident.

The author concludes that the predominant information needed during the initial response to a crisis is applicational. Nutritional information is generally employed during the monitoring and feedback periods of the crisis process. The institutions whose services or products derive from the sophisticated technologies of the mid-20th century tend to be proactive. That is, institutions with complex technological infrastructures tend to plan in advance for failures. These planning activities result minimally in the construction of contingency plans, including formal communications procedures in the event of crisis. Organizations which are reactive to the onslaught of a crisis tend not to have emergency procedures or plans which provide for the efficient mobilization and movement of STI. Bureaucratic structures which prepare operational contingency plans develop communication channels which minimize information overload, i.e., the situation where more information is acquired than can be handled. The study suggests that STI (or other information forms) is a necessary but not sufficient condition for crisis mitigation. Rather, the most important factors in enhancing the decision-making function during crisis are effective communication channels. The latter can be developed

consistent with the intent of bureaucratic structure, rather than with its dysfunctional characteristics, and with existing technology.

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Grant: DSI 75-13211
Date: February 1977

AN APPLICATION OF MARKET RESEARCH TECHNIQUES TO THE DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION. 219 pages.

Availability: NTIS, PB 265 130

The goal of the project is to develop a methodology which, when applied to the universe of scientific and technical information (STI) users, will provide facts and data to enable the producers and distributors of STI products and services to target their product design and their distribution and promotion efforts more effectively. Improved targeting of STI distribution and promotion efforts will, in turn, improve user access by increasing awareness of available STI sources and by facilitating user access to these sources. The nature of the project is developmental, with a focus on knowledge about user characteristics in general.

The methodology devised is based on the market research technique called "market segmentation." Questionnaires were completed through personal interviews with a scientifically designed, nationwide sample of 402 chemists and electrical engineers. Each respondent was asked to rank nine types of information needs in order of descending needs from one to nine. Results of this ranking were submitted in a computer program which statistically grouped responses into clusters in such a way that points in a single cluster corresponded to individuals with very similar needs, whereas points in different clusters represented respondents with markedly different needs.

The study validates the application of market segmentation to STI markets for improving user access to information. The data analysis has provided the description of six market segments in each discipline included in the sample. The analysis reveals that the segments have characteristics in common which STI producers and distributors can use to improve the satisfaction of these needs by identifying and targeting toward user groups that

might be interested in their products and services.

102 Fox, Herbert; Richard Griffin
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Grant: DSI 75-22651
Date: September 1977

COMPUTERIZED INFORMATION RETRIEVAL--A USER GUIDE. 60 pages.

Availability: Contact authors

A user guide which introduces the reade to advanced scientific and technical information services and systems (STI/SS) is presented. A program for locating information on searching the literature is suggested. In addition, discussions with colleagues, searches of personal and library files, and computer searches are recommended for locating information. The importance of each search step is stressed to achieve a resultant thorough search. A review of general and multiple-word computer searches is presented. Future possibilities for computer systems are outlined and a listing of Information Anayst Centers, Manual Indices, and Data Bases available through New York Institute of Technology Tech Search is included.

103 Freeman, James E.; James P. Kottenstette;
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Grant: SIS 74-19324
Date: May 1977

INFORMATION AND DATA FLOWS IN SOCIETAL PROBLEM AREAS, FOCUS: ENERGY. 65 pages.

Availability: Denver Research Institute Publicastion No. KNUTAP 5211-OIFR

The flow of scientific and technical information and data (STID) from research into decision making in efforts to solve important societal problems is discussed. Attention is focused specifically on administrative action/inaction in the energy area where STID flows are traced from fact finders, through integrators, to decision makers. Some

factors facilitating and impeding STID flows are identified, and several options that administrators have open for improving those flows are explored. Two case studies of STID flows related to decision making in the area of energy provide an empirical base for this project. The first concerns formal STID flows in the U.S. Department of Interior's Prototype Oil Shale Leasing Program. The second case deals with the energy-related knowledge requirements of top-level decision makers in Colorado state government.

First, orientation and definitions are provided. Second, the ways that three emerging social concerns--energy sufficiency, environmental protection, and citizen participation--are increasingly shaping communication concerning energy and decision making in the U.S. are examined. Third, a typology of energy information and data flows are presented, along with a set of eight key questions which administrators can use to determine the responsiveness of the information transfer arrangements they develop to facilitate energy problem-solving.

Results of the case studies are presented as answers to the eight key questions. No significant deficiencies were found in the scientific and technical information systems and services (STI/SS) used by persons in the cases examined, although some opportunities for improving STI/SS contributions to future energy problem-solving activities were discovered.

The authors state that the challenge to administrators and STI/SS designers is to help make such knowledge usable by people responsible for the social, legal, political, and economic dimensions of energy, environmental, health, and other national problems. They feel that meeting this challenge will require not only market research for STI/SS, but also administrative experiments in real-world settings.

104 Gottfredson, Stephen D.; W. D. Garvey; James Goodnow II
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Grant: GN-36193
Date: January 1977

QUALITY INDICATORS IN THE SCIENTIFIC JOURNAL ARTICLE PUBLICATION PROCESS. 89 pages.

Availability: NTIS, PB 266 993/AS

Since 1966, the Center for Research in Scientific

Communication has been involved in a study of the information flow and dissemination process associated with nine scientific and engineering disciplines. Having created a functional computer data base representative of a broad spectrum of scientific activities, the Center aims to update this base periodically in order to make it continuously useful in information studies. The goal of research in the period from 1972-73 was to examine what had happened to the information published in over 3000 journal articles which became part of the data base in 1968. Specifically, the investigators were interested in the impact of this information on scientific activity during the 5 years since it was published, the distinguishing characteristics of those articles which had a significant impact, and the potential of these characteristics as indicators of the quality of future work.

The work in quality indicators involved three approaches--the collection of additional survey data from scientists whose scientific communication activities were previously recorded in the Center's data bank; the gathering of bibliographic and citation data pertaining to the fate of the scientific works studied; and the identification, and collection of survey data from scientists nominated by their peers as being of sufficient caliber to judge the scientific merit of particular articles from the data bank in terms of the field as a whole.

Several important findings emerge from the study. There is no relation between an independent assessment of the quality of a given journal article, as judged by experts in the field 5 years after the article had been published, and the number of citations made to that article during that 5-year period. Knowing the subsequent productivity of an author does not allow the reader to estimate the quality of a given piece of his research. To some extent, the investigators were able to describe components of the expert's global judgments, but again these dimensions did not correlate well with citation findings.

Other publications:

104a Gottfredson, Stephen D.
SCIENTIFIC QUALITY AND PEER-GROUP CONSENSUS. Ph.D. Dissertation. Johns Hopkins University, 1977.

Availability: University Microfilms, Ann Arbor, MI

In a specific phase of the quality indicators study, a mail survey of editors and editorial consultants for nine

major psychology journals explored dimensions of qualitative evaluation, resulting in a set of prescriptive norms for assessment. Substantial agreement on the desirability of certain article characteristics was demonstrated, and the judgment criteria of persons heavily involved in the manuscript decision-making processes associated with the nine journals did not differ with respect to the dimensional structure obtained. Results of this study were used in a second mail survey to demonstrate substantially better reliability for actual peer judgments of the quality of scientific contributions than has been reported in the past.

104b Gottfredson, S. D.; W. D. Garvey, J. E. Goodnow II QUALITY INDICATORS IN THE SCIENTIFIC JOURNAL ARTICLE PUBLICATION PROCESS. Catalog of Selected Documents in Psychology, August 1977. In press.

104c Gottfredson, Stephen D.; James Goodnow II EVALUATING PSYCHOLOGICAL RESEARCH REPORTS: THE DIMENSIONS OF QUALITY. Paper presented at Eastern Psychological Association meeting, Boston, MA, April 1977.

A mail survey of editors and editorial consultants for nine psychology journals was conducted to explore dimensions of qualitative evaluation. Also reported are details of a survey of psychology faculty and graduate students evaluating the quality of a set of journal articles. This evaluation led to some assessment criteria to be applied to psychology journal articles throughout the study.

105 Grashof, John F.
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Grant: GN 42271, SIS 74-08626
Date: June 1977

AN EXPERIMENT IN THE APPLICATION OF MARKETING THEORY TO THE MARKETING OF STI PRODUCTS AND SERVICES. Proceedings of a Conference on the Application of Marketing Theory to STI, Pittsburgh, PA, March 1977. W. King, L. Zaltonan, eds.

Availability: Contact author

An experiment in the application of marketing theory to

encourage greater adoption of scientific and technical information (STI) products and services by small and medium-sized firms is reported. A 2 year program began with a comprehensive market-research project to study the market for and marketing of STI. During the second year, findings of the market research are being implemented. Interviews with 244 employees of 171 small, medium, and large firms using a questionnaire provided market data to be analyzed. Those with STI buying influence within the companies were identified. The most desirable features for STI systems as designated by data analysis are reported. The data suggest that there is no universally desirable STI system.

The firms analyzed differ in their preference for system characteristics. Firms should be selected as the target market. The variables to be considered include the size and other characteristics of the segments which may affect the ease and effectiveness of reaching them, the possible product lines the supplier can offer, and the number of STI systems one can expect to market.

The study indicates that firms purchase STI in much the same way as they purchase other goods or services, that is, through the operation of an organizational complex called a buying center. The buying center for STI includes as its primary member the R & D manager (except in small firms where it is the plant manager). Other managers having significant input to the STI purchase process are controllers and purchasing agents. Except in the very large firms the information specialist is involved little, if at all, in the purchase of STI.

The second conclusion is that there is no single product (or service) that will meet all the needs of firms using STI.

A final conclusion is that there are some product attributes that are of no importance to STI users and some that are of concern to part of the market, and that there are no characteristics which are important to the whole market.

A test, under operating conditions, to be conducted during the second year of the project will show whether such information as gathered in Year 1 can be of value in improving the marketing structure and methods of STI suppliers. The author feels that the study should also result in additional insights into the appropriate distribution channels and promotional mechanisms for STI products and services.

Other publications:

105a Grashof, John F.; Gloria P. Thomas
INDUSTRIAL BUYING CENTER RESPONSIBILITIES: SELF VERSUS OTHER MEMBER EVALUATIONS OF IMPORTANCE. Proceedings, AMA Educators' Conference, Memphis, TN, August 8-11, 1976. Chicago, American Marketing Association.

The results of an empirical test of one approach to identifying the varying responsibilities in purchase decision making (PDM) are presented. The relative importance of the various members of a decision-making unit (DMU) as evaluated by self and others is discussed. Research and development managers and librarians' influence on buying decisions were studied. Two questions posed to guide the research were: To what extent do the perceptions of R & D managers, the directors of information, and librarians of their own influence agree with the appraisals of others involved in the decision; and does this agreement (or disagreement) vary according to specific stages of the purchase decision process?

The results of the research indicate that for both groups studied there was a large degree of self-inflation of perceived influence. Implications of the study are discussed and future research in the area recommended.

105b Grashof, John F.; Yoram Wind
MARKETING RESEARCH IN THE DESIGN OF STI SYSTEMS: A CASE STUDY. In a reading book based on the Engineering Foundation Conference, Easton, MD, September 1976. Robert Mason and Pat Ferguson, eds.

The application of modern, scientific marketing research technology to the scientific and technical information (STI) industry is described through one case study. The identification of those involved in the purchase and use of STI within an organzation, their roles, and purchase patterns were investigated. Special attention was focused on users knowledge of STI systems and how that knowledge was applied to purchase decisions. A total of 274 interviews with 171 firms were conducted to determine those within an organization who make STI purchase decisions. Small, medium-sized, and large firms were included in the sample. The results suggest that STI designers should consider offering a number of products to match the needs of various industrial segments.

105c Wind, Yoram; John F. Grashof; Joel D. Goldhar
MARKET-BASED GUIDELINES FOR DESIGN OF INDUSTRIAL PRODUCTS. Journal of Marketing, In press (April

1978).

An application of conjoint analysis to the study of some features of new scientific and technical information (STI) services is reported. The project was designed to provide operational guidelines for STI system development. Personal interviews were conducted with 274 employees of 163 different companies. A conjoint analysis of desirable features of STI systems was conducted and resulted in guidelines for STI system design. A STI system considered most valuable by those interviewed is described. A system, designed as suggested by the study, is being tested and is to be marketed as a working system.

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Contract: C-1027
Date: February 15, 1977

USER VALUES IN THE SELECTION OF INFORMATION SERVICES. 82 pages.

Availability: NTIS, ED 121 331

Users' preferences among information services and their variations from time to time are analyzed in this study. The principal finding is that the value system which a given user applies in selecting an information service varies depending upon use as an event rather than upon the user as an individual. A given person may be acting as a scientist today, a searcher tomorrow, and a planner the next afternoon, and the service he prefers will depend upon his function at the moment. This functional relationship may explain why previous user studies tend to gloss over the behavior of the individual as being an erratic and unpredictable unknown.

The basic finding and its implications were developed by direct interviews with some 60 individuals. The technique applied was a dimensional analysis of the factors in the selection process which each user considered most important. It was possible to group selection factors in three dimensions--quantifiable and judgmental. These were all recognized as important by all user groups, but sharp differences were evident in the relative values they perceived. Lists of discriminant factors were first prepared through interviews with specialists who spend over 50% of their time in information research. The lists were then

expanded to include users who were scientists, engineers, attorneys, and planning staff.

In practice, the functional approach can help defuse areas of potential conflict in assessing information needs. A new small business needs a broad view of information to satisfy the needs of both corporate planning and research and development; the information specialist in a small library may be valued most for noncomputerizable skills in matching input to a system to the function of the user. It is possible in each of these cases to detect points of view which could be easily recognized by disagreeing parties as different but not opposite. Accepting these differing viewpoints as a valid basis for joint action avoids the destructive effects of a forced choice between them.

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Grant: DSI 76-09055
Date: August 1, 1977

EVALUATION OF THE MANLABS-NPL MATERIALS DATA BANK AS A VEHICLE FOR ENHANCING UNIVERSITY EDUCATION AND RESEARCH. 129 pages.

Availability: Contact author

An evaluation of the MANLABS-NPL materials data bank as a vehicle for enhancing university education and research is presented. A combination of National Physics Laboratory (NPL) thermochemical data bank and MANLABS series of computer-based calculating programs for solving stable and metastable phases in binary and ternary alloy systems was used in graduate and undergraduate coursework at M.I.T., Drexel, University of Michigan, and Pennsylvania State. An assessment, including comments from students and professors, was submitted to the investigators at the end of the trial period. In general, an evaluation of teacher and student response showed a favorable reaction to the computer-assisted instrumentation in phase diagrams. There was no indication that the program aided outside projects or research. Approximately 78% of the participants felt that they gained additional knowledge about thermodynamics from the project. Appendices include a description of the MANLABS-NPL materials data bank, vitae of participating professors, chief evaluator, and project director, as well as organization meeting notes, and course offerings which include the project work and a resultant term paper by B. Stephenson at M.I.T.

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Grant: DSI 76-05760
Date: October 1977

LIBRARY PHOTOCOPYING IN THE UNITED STATES. 273 pages.

Availability: GPO 052-003-00443-7

A study of the amount of photocopying of library materials by library staff in United States libraries is presented. A national survey was conducted from a sample of Public, Academic, Special, and Federal libraries to determine the annual volume of photocopyintg undertaken for interlibrary loans, local users, and intrasystem loans. Since interpretations of the Law concerning eligibility for royalty-payment appear to vary, data are also given for the amount as they might be interpreted in the new Copyright Law and in guidelines set forth by the National Commission on New Technological Uses of Copyrighted Works (CONTU) for photocopying for interlibrary loans. The report documents the effects of these hypothetical conditions from the perspective of both libraries and publishers. In addition, the report describes alternative royalty payment mechanisms and discusses some advantages and disadvantages of each from the standpoints of small and large libraries and small and large publishers. This summary presents estimates of total volume of photocopying, analyzes implications of the new Law from the perspectives of libraries and publishers, and describes alternative payment mechanisms. Ninety-seven tables and 31 figures are included. Sampling and data collection procedures are discussed.

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Grant: DSI 76-10129
Date: September 1977

THE DEVELOPMENT OF COURSE RELATED LIBRARY AND LITERATURE USE INSTRUCTION IN UNDERGRADUATE SCIENCE PROGRAMS. 4 Vol., 486 pages.

Availability: Contact author

Four institutions were selected to help develop course-related instruction techniques for library and literature use in undergraduate science programs. The four

institutions which concentrated their efforts in various scientific fields were: University of Arizona--engineering; Oregon State University--microbiology; St. Olaf College--biology; and Johns Hopkins University--biophysics.

The project attempts the development of techniques that can be used within existing courses for improving literature-use skills of the undergraduate science students. It attempts discussions and application of these techniques in selected institutions. These activities will be followed by dissemination of the results to the library and education professions.

A workshop conducted in October 1976 to familiarize participants with the project was divided into three areas. During the first portion, participants concentrated primarily on information transfer. The portion was concerned with the participants' own projects. Since it was assumed that the interaction of group members on a social level was important for the success of workshop components, such as common housing, group activities comprised the third area of workshop activity. The workshop was favorably received and positively evaluated by participants.

The purpose of a May 1977 summary workshop was the participant teams' communication to the Project Director and to each other.

Copies of participant applications, announcements, and workshop transcripts are presented as part of the text. Earlham's program for developing literature-use skills are outlined and copies of projects to teach the skills are included. Consultant's and participants' analyses of the program are used to evaluate the project.

Plans for the second year of the program are discussed.

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Grant: SIS 75-22946
Date: April 1977

COMPUTER INTERFACES FOR USER ACCESS TO HETEROGENEOUS INFORMATION-RETRIEVAL SYSTEMS. 84 pages.

Availability: NTIS, PB 269 126

To investigate means of surmounting obstacles that

hinder convenient and effective use of heterogeneous interactive bibliographic retrieval systems, the Electronic Systems Laboratory has undertaken a research program to examine the feasibility of interconnecting interactive retrieval systems through computer interfaces. The computer interface would achieve compatibility among systems of heterogeneous hardware and software components through use of common retrieval protocols or by translating dissimilar protocols to a common set.

An experimental, translating computer interface that provides a common, or virtual-system, mode of access to a network of heterogeneous on-line bibliographic retrieval systems has been developed to the point that the investigators could experimentally demonstrate enhanced access by end users. This development encompassed three aspects, namely, the implementation of an auto-call mechanism for connecting from the interface to remote systems; the implementation of a message interpreter; and the development of an advanced experimental interface designated CONIT, Connector for Network Information Transfer.

The interface employs a content-sensitive message interpreter whose interpretations are functions of translation-rule tables. The interpreter provides a dynamic, flexible means for handling the automation of the interconnection of computer and human retrieval protocols. Experimental analysis has provided preliminary evidence of success for various computer-assisted instructional techniques being employed, as well as an indication of basic tradeoffs and limitations in their implementation in working systems. An auxiliary byproduct of the project is that the interface explored can be used as an experimental research tool for evaluating modifications to retrieval-system features without disrupting the retrieval system for which such evaluation is sought.

Other publication:

110a Marcus, Richard S.
NETWORK ACCESS FOR THE INFORMATION RETRIEVAL APPLICATION. 1975 IEEE Intercon Conference Record, (1975 International Convention and Exposition of the Institute of Electrical and Electronics Engineers, Inc.) Session 25, No. 4, pages 1-7. The Institute of Electrical and Electronics Engineers, Inc., April 1975.

This paper provides a review of research studying the

translating interface between heterogeneous computer systems.

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Grant: SIS 74-14127
Date: January 1977

IDENTIFICATION AND PREPARATION OF DERIVATIVE INFORMATION PRODUCTS REQUIRED BY SELECTED USERS OF SCIENCE INFORMATION. 115 pages.

Availability: NTIS, PB 270 631

One area of research using computer-based systems for storage and retrieval of science information is the delivery of the knowledge required by users rather than citations to documents which contain the needed knowledge. The outputs of these future systems are assumed to be derivative information products whose content and format match the specific need of the individual user. The purpose of the effort is to identify the kinds of derivative information products needed by users of science information, and to delineate some of the characteristics of the use and his work which determine how the product should be designed.

The identification of main categories of derivative information products needs was accomplished through structured interviews with 14 researchers and 12 teachers active in the field of environmental science. The delineation of product-design criteria for individual users was accomplished in case-study fashion, working in an on-line mode with two researchers and two teachers to develop specific, derivative information products in response to their current work requirements. Derivative information products were prepared by information specialists with no particular training in the user's field of expertise. The specific design of each product prepared for the two researchers reflected the user's present knowledge of the problem, the decision-task in the overall research process which he needed to resolve, the way in which he structured the variables of concern, and the strategy by which he chose to approach the problem. Product-design criteria for the teachers, on the other hand, were based on characteristics of the student population for which the products were intended.

Overall, the results of the current work document the needs for derivative information products and demonstrate

that highly acceptable products can be prepared by information specialists on the basis of structures determined in task-analysis interviews with the user.

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Grant: DSI 76-09737
Date: December 1977

Availability: Contact author

INDIVIDUALIZED INSTRUCTION FOR DATA ACCESS. In Proceedings of 1st International On-Line Information Meeting, London, Dec. 13-15, 1977. New York, Learned Information, pages 179-194.

Progress is reported on the development of the Individualized Instruction for Data Access (IIDA) system. The IIDA concept is based on use of an intermediary computer between the user and a data-base processor. The computer will administer a computer-assisted instruction course of searching, will monitor "live," on-line searches of a data base and help the student perform them. While syntactic errors can be detected and correctd, a student's strategic errors can be detected only by the complex diagnostic programs which are central to IIDA. IIDA is primarily intended for direct users of scientific and technical information systems, typically scientists and engineers who perform a few bibliographic searches per year and who have found working through a technical library to be unsatisfactory. The design phase of IIDA has been completed, and a model constructed and demonstrated to be feasible. During the next phase, a full system will be implemented for testing with a commercial data-base search service and a group of actual bibliographic searchers.

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Grant: DSI 75-15482
Date: November 1977

FEDERAL ENVIRONMENTAL DATA: A DIRECTORY OF SELECTED SOURCES.

Availability: NTIS, PB 275 902

A directory describing major environmental data bases maintained by U.S. government agencies is presented. Its purpose is to assist various individuals and organizations outside the Federal establishment in locating and utilizing the extensive environmental data resources that are available.

This directory contains standard items of information on each selected environmental data base, such as source name, source agency, objective, general description, size, update frequency, time reference, cost, turnaround time, product, and person to contact for information. The data bases described have been drawn mainly from the Department of Agriculture, the Department of the Interior, the Energy Research and Development Administration (now DOE), and the Environmental Protection Agency. A few important data bases from other Federal agencies were also included.

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Grant: DSI 74-13972
Date: September 1977

INVESTIGATION OF THE PUBLIC LIBRARY AS A LINKING AGENT TO MAJOR SCIENTIFIC, EDUCATIONAL, SOCIAL, AND ENVIRONMENTAL DATA BASES: FINAL EVALUATION REPORT. 117 pages.

Availability: NTIS, PB 261 860 (Vol. 1); PB 261 861 (Vol. 2); PB 261 858 (Vol. 3)

The viability of providing access to major on-line bibliographic data bases to the public via public libraries is evaluated. The impact of that type service on the library is assessed.

To implement the evaluation, a 2-year project (DIALIB) was initially planned in which four libraries would offer access to the data bases free of charge during the first year but would have to recover 50% of the search costs during the second year. At the end of the second year it was decided to extend the project for a third year in which the libraries would recover all the retrieval service costs (terminal connect time and printing charges). Two libraries participated during the third year.

The first year of the project was primarily a learning period. The service was initially advertised quite widely, and no limits were attached to its use. The free search policy generated a significant search volume and librarians

found themselves hard-pressed to cope with it.

All four libraries chose to provide the 50% support requirement through the imposition of patron fees. The imposition of fees generated an abrupt drop in search request volume, although the volume gradually increased after the initial drop. In the second year, the search style changed significantly. Staff time per search increased (primarily in presearch preparation), the connect time per search decreased, and the number of citations increased. The participating libraries did not publicize the search services.

During the third year, the search volume remained relatively constant--well below what the librarians felt was the "stress level," but the policy of no publicity continued.

The author concludes that there is a market for existing data bases and that the public library is capable of meeting this market. Further, he states that development of an on-line reference service requires staff commitment and training. The library staffs felt that a critical mass of searches (5-10 per month) is necessary to maintain search competence. Supporting the service financially is a major problem.

Other publication:

114a Firschein, Oscar; Roger K. Summit; Colin K. Mick USE OF ON-LINE BIBLIOGRAPHIC SEARCH IN PUBLIC LIBRARIES: A RETROSPECTIVE EVALUATION. Online Review, in press.

115 Murdock, John W.
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Grant: DSI 76-17294
Date: 1977

FINAL REPORT ON CURRENT KNOWLEDGE AND OPPORTUNITIES IN NUMERICAL DATA INDEXING AND POSSIBLE FUTURE DEVELOPMENTS.

Availability: NTIS, PB 279 924

Ideas developed over the last 10 years on data indexing

and recommendations for future research, development, and implementation are presented.

The objectives of the study were to analyze the state of the art of indexing and numerical data contained in the scientific and technical literature; to identify problems associated with data indexing and data accessibility; to assess the associated problems and opportunities; and to develop recommendations for those who are concerned with improving data accessibility.

The author states that ease of access to numerical data contained in the scientific and technical literature is a vital need to researchers who must cope with data-intensive areas such as energy, conservation, health, and environment. Abstracting and indexing services usually have not provided information on the existence or nature of numerical data contained in the literature. The author feels that the addition of data indexing in the primary and secondary literature appears to offer one means of improving access to data. He concludes that there appears to be an increasing need for data indexing.

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Grant: DSI 76-12161
Date: May 25, 1977

COSTS AND BENEFITS OF SOME ALTERNATIVE INFORMATION DELIVERY SYSTEMS OF 1985. 85 pages.

Availability: Contact authors

This report deals with the relative costs of scientific and technical information systems which will be technologically feasible in 1985, and with the systems problems and external influences which could affect the costs and the acceptance of these systems. Although the technologies evaluated could be used for many different functions, the study considers only the problems of production, delivery, and subsequent storage of journals and handbooks. The study stresses the information needs of the individual scientists and engineers either as employees or as independent businessmen.

Seven information delivery systems, ranging in technological sophistication from print to videodisk and slow-scan television were defined and were evaluated for

their suitability and cost-effectiveness in handling technical and scientific information corresponding to present-day journals and handbooks. Although the use of satellites was considered for long-distance communication, it was assumed that the information capacity of all communication links, except for broadcast television, would be limited to maximum phone-line speed (9600 BPS), since all terminal equipment would be connected to standard telephone lines.

Several general conclusions appear from the study. Technology existing today can meet all foreseeable needs for distribution and storage of scientific and technical information. Costs, however, are extremely sensitive to external factors which are beyond the control of the user communities. Standardization of equipment to ensure system compatibility is essential if the full potential of information technology is to be realized. Until Congress has resolved the question as to what constitutes fair use of copyrighted work, it will be extremely difficult to establish any large-scale information retrieval system using copyright-protected material. The cost-effectiveness analyses summarized in the report are contingent upon the existence of an infrastructure within the scientific, engineering, and information communities which allows relatively unrestricted exchange of information using the most suitable technology.

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Date: 1977

ORGANIZATIONAL FACTORS AFFECTING INFORMATION FLOW IN INDUSTRY. Aslib Proceedings, Vol. 29, No. 1, 1977, pages 2-11.

The current state of the Scientific & Technical Information (STI) system in several companies was compared with a model of information flow in an ideal 'open organization'. This ideal can be best characterized by a cycle: confidence in others in the organization leads to trust and therefore to joint problem solving on issues about technical processes, products, or any research and development phase. Collaboration leads to increased flow of technical information between persons and sections of the company which in turn develops greater trust and more information flow. To collect the data, the study team administered questionnaires and interviewed the top manager

and all professionals in three companies. The researchers then conducted 1-day feedback sessions after which the company held departmental meetings to discuss the feedback.

Two characteristics related to the management of research and development perceived as beneficial by all three companies were high morale and a general commitment to employee career development. The unhealthy organization would show lack of feedback from the top, minimal communication, and little involvement of the research professionals in decision-making. It is too early in the project to describe specific actions which will reduce the unhealthy characteristics in an organization, but the greatest effect will be seen in the areas of: (1) management philosophy, (2) interpersonal and intergroup conflicts, (3) technical information and the information center, and (4) relations between management and research professionals.

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Contract: C 76-05489
Date: August 1977

COMPUTER ASSISTANCE IN INFORMATION WORK. Part I. Conceptual Framework for Improving the Computer/User Interface in Information Work. Part II. Catalog of Acceleration, Augmentation and Delegation Functions in Information Work. 105 pages.

Availability: NTIS, PB 271 538

The role of the computer in performing information tasks that users now perform without computer assistance was investigated. A short-term goal was to accelerate or augment users' perceptual/cognitive processes with the computer. A long-term goal is to delegate information tasks entirely to the computer.

Information work (the production, distribution, transformation, storage, retrieval, and use of information) was analyzed in terms of information tasks that are more generic than each type of information work itself. For example, "decision making" is an information task in itself, but it also names a sequence of tasks that includes formulating a problem, determining information needs, searching for information, selecting and processing relevant information, comparing alternative decisions, and making the decisions.

Cybernetic and psychological theories help to identify 12 perceptual/cognitive processes that underlie information tasks: scanning, fixating, feature extracting, decoding, comparing, deciding, inducing, deducing, retrieving, selecting, transforming, and producing. The resultant framework is a derivative of the Newell Simon "adaptive information processing system," and the Miller-Galanter-Pribram "TOTE unit."

Fourteen functions that the computer may perform to accelerate, augment, and delegate the perceptual/cognitive processes which underlie searching, solving, or deciding are listed.

Part II consists of an illustrative catalog of computer functions that can be implemented via hardware and/or software and concludes with recommendations for research and development which could improve computer assistance in information work.

The authors state that it is neither necessary nor desirable that totally new information systems be designed in the next decade to accommodate user communication functions. Four types of existing systems, information storage and retrieval, teleconference, instruction, and decision support, should be regarded as extendable with respect to new functions. Since existing systems permit low-cost evaluation of new functions, development of experimental programs in areas of acceleration, augmentation, and delegation using existing systems is recommended.

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Contract: C-1025
Date: June 1977

THE IMPACT OF COMMUNICATION TECHNOLOGIES DESIGNED TO SUBSTITUTE FOR TRAVEL ON SCIENTIFIC AND TECHNICAL COMMUNICATION. 49 pages.

Availability: NTIS, PB 269 669

This impact synthesis paper isolates a number of scientific and technical communication processes and measures, to the limited extent possible, the potential effects of telecommunications upon the individual processes and upon the broad system of processes through which

scientists and technologists communicate. The use of telecommunications to bring sessions of professional meetings to miniconventions in distant cities is discussed in some detail and found to be at least economically attractive.

The author focuses on scientists and technologists and their normal communications patterns. He traces many specific effects discussed in other impact papers upon this societal subgroup and its communication processes.

The author suggests that crisis-oriented Federal agencies, such as the Energy Research and Development Administration (ERDA, now DOE), might use telecommunications to help mobilize scientific research and information dissemination with their spheres of concern, and also to handle its internal work, including project oversight and review committee meetings. "Noncrisis" agencies, such as the National Science Foundation, might also use these services.

The implications of telecommunications for scientists working from the home or neighborhood work centers are discussed only superficially, because the effects of such work realignments upon scientists and technologists are likely to be about the same as on those on other office workers, given our currently modest level of analytical precision. Effects upon the formal written communication systems of science are also discussed only superficially, first because telecommunications should affect written communication channels only tangentially, and second because several NSF studies now looking at telecommunications and written communication systems should soon provide information in some detail.

Because teleconferencing could substantially increase access to scientists, the author recommends that research be undertaken to probe the implications of teleconferencing.

He also recommends research to probe traffic, costs, and effects in crisis-oriented and other research.

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Contract: GN-40952
Date: January 1977

SEMIOTIC FOUNDATIONS OF INFORMATION SCIENCE. 48 pages.

Availability: NTIS, PB 265 897

The research reported begins a long-term program of fundamental investigations into quantitative semiotics. The principle motivation of the program is the study and elucidation of information processes. Specifically, the program aims to develop a theory of the structure of signs, sign systems, and sign processes. This includes investigations of the measurable properties of all sign components and studies of the basic regularities existing between these properties; the theories developed will explain the regularities. The program will also study the relationships between various information and semiotic processes, such as perception, memory, recall, conception, communication, classification, recognition, decision, and others.

The new theory of sign structure proposed explains the syntactic, semantic, and pragmatic classification of signs due to C. Pierce. The theory comprises, in part, a language capable of relating studies of information processes across a range of disciplines, including communication science, psychology, computer science, and linguistics. The power and utility of the theory and language are illustrated by using it to explicate empirically such syntactic and semantic processes as perception, syntactic communication, and memory coding. The development and activities of the SemLab, a semiotic research laboratory dedicated to empirical investigations of information phenomena, are described.

In addressing the question of the utility of this research to practical issues in information processing, the authors are mildly speculative. A full understanding of symbol structure will be required to develop theories in programming semantics. The studies of sign structure suggest that the pragmatic dimension is independent of the semantic dimension. In order to develop appropriate theories of programming pragmatics, an understanding of the pragmatic structure of signs is required. The theory of sign structure also appears to provide a useful framework and a tool for the empirical development of program-control functions and their notations.

Other publications:

120a Garner, W. P.
REVIEW OF THE PROCESSING OF INFORMATION AND STRUCTURE. To appear in Computing Reviews.

120b Pearson, Charls

INFORMATION SCIENCE AND THE UNIVERSAL STRUCTURE MODEL. To appear in Foundations of the ASIS. 1977.

120c Pearson, Charls
LAB MANUAL FOR SEMIOTICS. 1975, revised August 1976. 76 pages.

Availability: Georgia Institute of Technology Publication 017-16006-0

This manual was written for a semiotics laboratory in conjunction with other undergraduate courses in semiotics at Georgia Tech. The experiments in the manual were chosen with these particular courses in mind; however, several were included purely for their intrinsic semiotic interest. The manual is designed not only to present experiments, but also to instill in the student the classical attitude gained in other scientific labs, namely, a questioning nature. Therefore, part of the manual is devoted to teaching the student the use of a scientific diary, recording of data, and preparation of the laboratory report.

120d Pearson, Charls
SEMIOTIC RESEARCH AT GEORGIA TECH--1974. American Society for Information Science, annual meeting, 1974, Technical Session 6, 8 pages.

In these introductory remarks, the author presents work done at Georgia Tech in sign structure and relates it to other research in the field. This presentation is in essence a literature review and provides background material to semiotic work.

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Grant: DSI 76-01990
Date: 1977

DATA BASE SELECTOR FOR NETWORK USE. A FEASIBILITY STUDY. Proceedings of the 40th Annual Meeting of the American Society for Information Science, Chicago, September 26-October 1, 1977.

The feasibility of an automatic Data Base Selector (DBS) is being tested at the University of Illinois. The DBS will operate on user query terms and provide a relative

ranking of data bases according to their applicability to the query. The test version Data Base Selector will consist of a file containing terminology from 20 major data bases, programs for data management and file generation, programs for query processing, and a mathematical model for normalizing the variability (differing numbers of years' worth of files, controlled versus uncontrolled terminology, hierarchical and multilevel vocabularies, etc.) that is found in multiple, natural-language data bases. The authors state that a DBS would be of use to data-base users, data-base producers, and data-base processors. They feel that it could help users and searchers determine file appropriateness for queries or help processors and producers with data-base comparisons, vocabulary comparisons, and vocabulary compatibility problems.

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Contract: C 76-05637
Date: April 1977

SYSTEM CONCEPTS FOR NETWORK USE OF FULL-TEXT FILES. 214 pages.

Availability: NTIS, PB 267 206

The storage of scientific and technical information in computer-sensible, full-text files is now technologically feasible because of recent advances in mass, on-line storage systems. The purpose of this program was to develop system concepts for the provision of full-text files over a resource-sharing network.

The program divided naturally into two distinct phases. First, system models and hardware and software characteristics and configurations were examined to establish the technological and economic feasibility of full-text files systems, either now or in the near future. Comparative performance/price data for subsystems applicable to full-text systems were assembled. Additionally, the authors examined the applicability of existing computerized literature searching and cataloging systems, such as those provided by Lockheed, System Development Corporation, and the Ohio College Library Center, to the indexing and searching functions needed to establish the existence and location of full-text files. In the second phase, the less-quantifiable questions of the political, social, and organizational feasibility of full-text file systems was examined in order to evaluate methods of fostering the

development of such systems and to compile an agenda of programs and/or advanced studies required to develop and promote the use of full-text files.

In order to provide a framework within which to provide a coherent, internally compatible series of answers, the authors postulated a scenario detailing one way in which the full-text file storage, distribution, and local access system might come into being in the next few years. The problems of designing large-scale systems are such that the system will have to evolve through successive generations of sophisticated subsets of the overall system, rather than being implemented all at once.

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Grant: GN-41628
Date: August 1977

DEVELOPMENT OF A THEORY OF INFORMATION FLOW AND ANALYSIS. In The Many Faces of Information Science, Edward C. Weiss, ed. Chap. 2, Westview Press, pages 19-51.

Availability: Ohio State University OSU-CISRC-TR-77-12, or contact publisher

Research leading toward a general theory of information flow and analysis is described. The objectives of the research program include the development of a theory of information flow and analysis, the identification of important parameters and variables in the information process which can be quantified and measured, and the development of relationships among the variables which describe their behavior and limitations. The objectives extend to the application of this theory to specific practical situations, particularly those involving science information, and the development of both simulation and experimental models for quantification and validation of the theory.

The generalized model of information flow is shown to represent virtually any decision situation. Using the model, a number of measures are derived. With these measures the amount of information in a decision state can be quantified and the decision maker effectiveness (DME) can be determined. The value of information through its effect on DME can also be determined.

Rules are derived for use by the decision-maker for

assimilating new data in his estimates of values and for use in determining selection probabilities for various courses of action. These rules enable feedback, learning, and alternative selection to be modeled, measured, and evaluated. Research is underway to validate the model realistically and to apply it to practical situations.

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